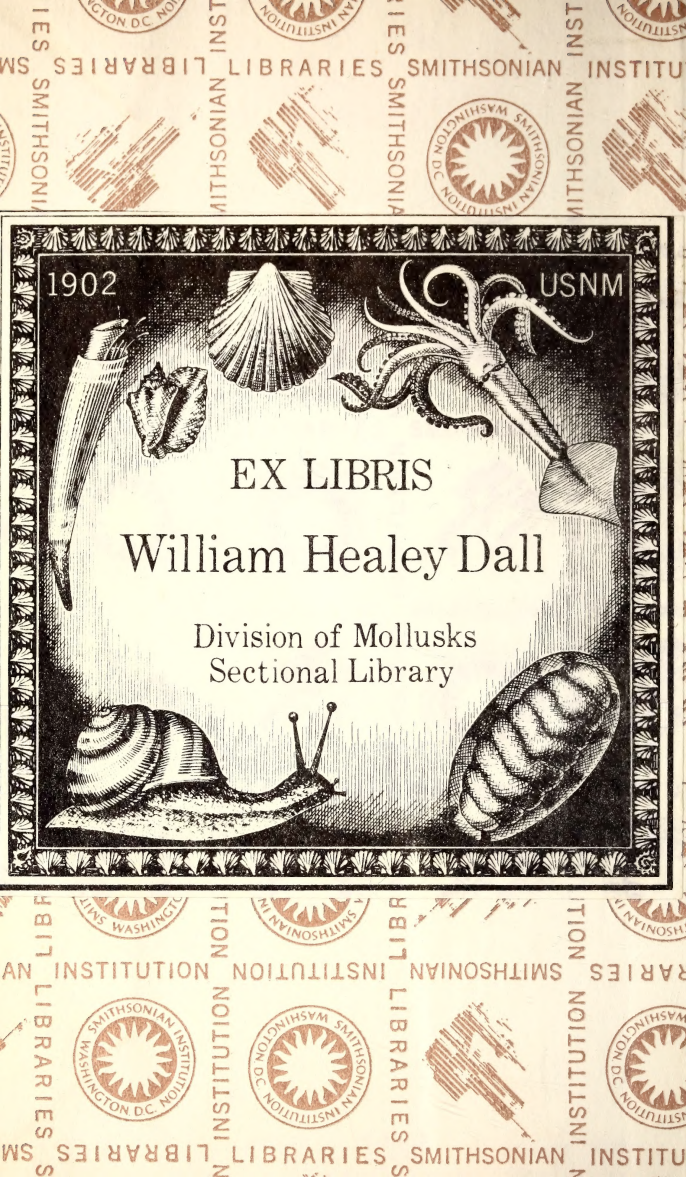
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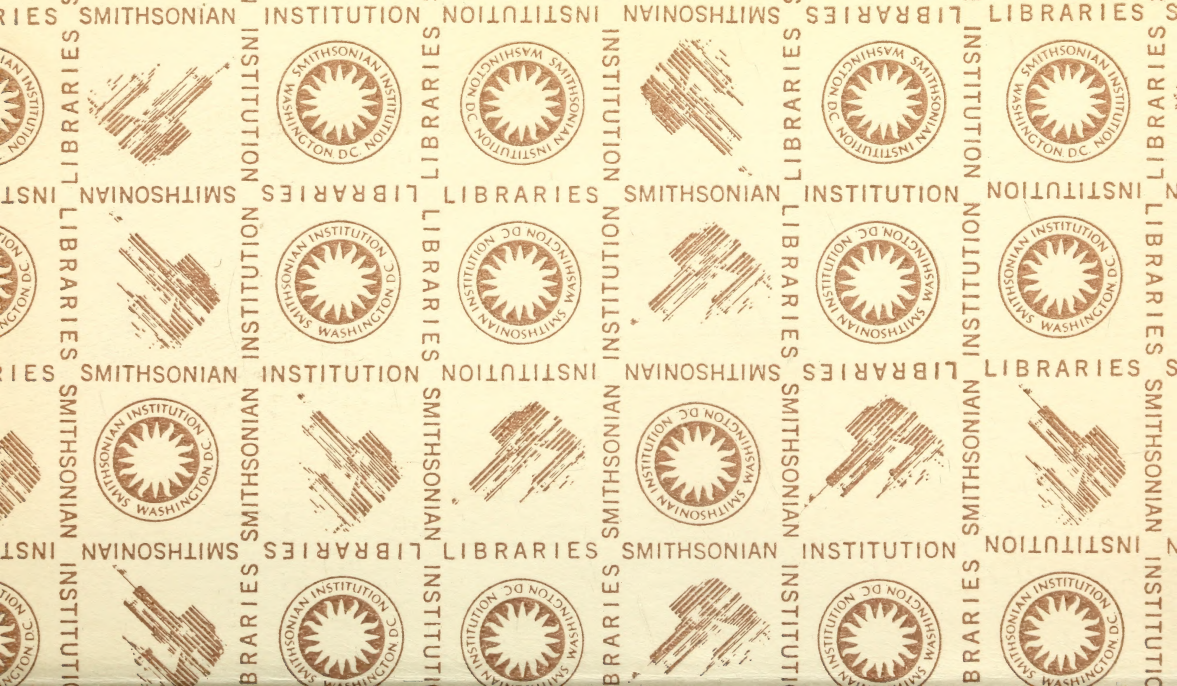
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# POPULAR CONCHOLOGY;

OR,

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BEING

An Introduction

TO

THE MODERN SYSTEM OF CONCHOLOGY.

WITH A SKETCH OF
THE NATURAL HISTORY OF THE ANIMALS,
AN ACCOUNT OF THE FORMATION OF THE SHELLS,
AND
A COMPLETE DESCRIPTIVE LIST OF THE FAMILIES
AND GENERA.

BY

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TO

# MRS. CORRIE,

OF WOODVILLE, NEAR BIRMINGHAM;

WHOSE ACQUIREMENTS IN VARIOUS BRANCHES
OF SCIENCE ARE EQUALLED BY
THE GENEROSITY AND BENEVOLENCE WITH WHICH
SHE MAKES HER KNOWLEDGE AVAILABLE
TO OTHERS;

**This little Work,**

INTENDED TO RENDER THE STUDY OF CONCHOLOGY
POPULAR,

AND WHICH OWES ITS PUBLICATION TO HER KIND
ENCOURAGEMENT,

IS

GRATEFULLY DEDICATED BY

THE AUTHOR.

# PREFACE.

THE following pages are designed to facilitate the study of a branch of Natural History which is daily becoming more attractive and more important; not only from its intrinsic interest, but also from its multiplied relations with Geology. They will furnish the young Conchologist with an elementary manual, which, although scientific in its form, is, by the simplicity of its method and the familiarity of its style, calculated effectually to assist him in the early steps of his progress in this fascinating pursuit. The satisfaction he may have derived from possessing specimens of shells cannot fail to be greatly increased when, by the aid of this little volume, he has learned how to arrange them in proper scientific order, and discovered their names, localities, uses, and habits. When his cabinet has been thus

arranged, he will view it with a delight infinitely greater than that which could be afforded while it remained in confusion; and he will be further induced to enlarge his knowledge of the subject by consulting more extended and more elaborate treatises; nor will he rest satisfied until he becomes complete master of the science in all its bearings.

Among the many works which have been published on Conchology, there is none which appears exactly to answer the purpose intended by the present volume. Most of them are addressed exclusively to men of science, and are encumbered (to them enriched) with a vast mass of details, the attempt to embrace which would only confuse and embarrass a beginner; while others, which profess to be elementary, are inapplicable to the purposes of exact arrangement. The system which has been here followed is that adopted by Lamarck in his great work, entitled "Les Animaux sans Vertèbres;" but the genera established since that work was written have been inserted wherever it was possible. To each new genus is attached

the name of the naturalist who introduced it, in order that it may be distinguished from those mentioned by Lamarck himself. To avoid confusion, however, no great change has been made in the systematic arrangement.

The author wishes, in this place, to acknowledge the kind assistance, and valuable information, she has received from a gentleman well versed in the science, but to whom she is personally unknown; and to express her thanks to a kind friend for some of the drawings by which these pages are illustrated. She would be ungrateful, were she not also to acknowledge the instruction she has received from her friend Mr. Swainson, whose works on Natural History are so well known to the public, and who first turned her thoughts to the study of Conchology, which she trusts her humble efforts will have rendered interesting to those for whose information this volume was written.

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## ERRATA.

Page 29. line 4. for "*Dorsaliadæ*" read "*Dorsalidæ*."
31. line 1. for "*Maldaniadæ*" read "*Maldanidæ*."
36. line 1. of note, for "*Magillus*" read "*Magilus*."
49. line 10. for "Cumming" read "Cuming."
173. line 8. for "CLAUSILEA" read "CLAUSILIA."
line 15. for "*Clausileæ*" read "*Clausiliæ*."
188. under first wood-cut add "*c*, young state of Valvata; *a*, *b*, more advanced."

# POPULAR CONCHOLOGY.

## INTRODUCTORY CHAPTER.

THE study of shells is one of the most interesting that can be pursued by a lover of Natural History. If he confine himself to their external appearance, and compare them with the other orders of creation, with reference only to the beauties they present to the eye, he will find that they are inferior to none in form or colour, exhibiting the most exquisite contours, with the most varied and beautiful tints; if he pursue his examination further, and without limiting himself to the exterior, fix his attention upon the living animal, as well as upon the inanimate shell in which it resides, and which it constructs itself, he will be amply repaid by the search; he will find the same harmony existing in all its rela-

tions, the same adaptation of means to the end required, the same fitness of the creature for the element in which it is to reside, and the mode of life it is to pursue, as he will trace in the more complicated and apparently more perfect classes of animals; finally, should he enter into a more scrutinizing investigation, and make it his object to become acquainted with the physiology of the animal, apart from its shell, and to pursue its history from its production to its death, following its gradual increase and advancement to its perfect state, including in his researches the formation of its shell, and the mode by which it receives enlargement and colour, he will here again find the study of shells as interesting as that of any portion of the created kingdom.

The most familiar name by which the study of shells is known is *Conchology.** In pursuing this pleasing branch of Natural History, whether an extended or limited view is taken, it is necessary, in the first place, to know something generally of the animal, its growth, the

* From *conchylion*, Gr., or *concha*, Lat., *a shell*, and *logos*, Gr., *a discourse*.

mode by which it forms its shell, its place of residence, and habits, before entering upon a minute and classified division. The present chapter will therefore have these objects in view.

The animals which inhabit and form shells are called *Mollusca* *, and, as their name signifies, have a soft body, most of them being entirely destitute of bones, though some are provided with internal shells, more or less perfectly formed; some species of slug, for instance, have internally a rudely shaped hard body, and others a mass of small grains. To compensate for the apparent deficiency in this respect, and to enable them to provide themselves with a defence against any injury to which they might be liable from so delicate a structure, they have been furnished with an external skin or envelope, covering them more or

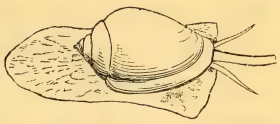
* From *mollis*, Lat., *soft*, and *esca*, Lat., *flesh*. Lamarck gives the name of Mollusca only to those which inhabit univalve shells, but naturalists now generally comprise under that appellation the inhabitants of both univalves and bivalves.

less completely, and from which they are able to exude a liquid, which, on exposure to the air or water, hardens into shell, and thus most of them are enabled to cover themselves with a secure, and at the same time commodious and beautiful habitation, into which they can, by the aid of strong contractile muscles, retire far enough to escape from danger when it approaches. This outer skin is now usually called the *mantle,* and is common to most species of mollusca. As nearly all these animals live entirely in the water, from which they derive their nutriment, and which they breathe by the aid of *branchiæ**, resembling the gills of fish, it is necessary that a means should be provided for the admission of that fluid to the interior of the body, and in order to effect this, certain openings occur in the mantle, through which the water passes, and by which also the head and foot, when these limbs exist, are put forth and drawn back at the will of the animal.

*Mollusca* do not all possess heads, one entire class being quite destitute; when they do exist,

* The fringed appendages in the interior of the oyster are the branchiæ of that Mollusc.

they are usually provided with *tentacula*, by which the animals feel their way, and which they have the power of easily retracting when danger threatens; they have occasionally also eyes, and other organs of sense, but they vary much in this respect, some possessing those of sight and hearing*, whilst others are devoid of both, and apparently enjoy only that of touch. That limb, which, from its being an organ of motion, has been called the *foot*, is much more universally found amongst mollusca than the head, and is a member of considerable importance. A few words only are necessary with regard to the internal construction of these animals; they possess the usual organs necessary for the support of life, a nervous system, a heart, with its attendant veins and arteries, furnished with a cold and white or blueish blood, and an apparatus for breathing, consisting, in those which live in water, of branchiæ placed externally or internally, and so arranged as to



* The latter sense, it is said, is confined to the *Cephalopoda*.

have a stream of water continually presented to them, and in those which live in air, of organs fit for its respiration.

*Mollusca* are to be found in all parts of the world, in the sea, in rivers, and on land, and differ in their construction and habits according to their locality. A great number have their residence in the sea, and are unable to exist out of salt water; of these some float on the surface, others have the power of moving through the deep waters, and others again are attached by various means to rocks and other substances below the surface. Many species are met with, living on the sea coast, in the sand, mud, or cliffs, and many in rivers: the land also has its peculiar varieties, either living under ground, in holes of trees, or in moist and marshy places. These different habitations give a general name to the Mollusca which are found in them, as *Pelagic**, to those which reside in the deep recesses of the ocean, *Litoral*†, to such as are found on the coast,

* From *pelagus*, Lat., *the depth of the sea.*

† From *litoris*, Lat., *of the shore.*

*Fluviatile**, to those which inhabit rivers, ponds, &c., and *Terrestrial*†, to the species which are met with on the land.

The methods of *locomotion* adopted by those Mollusca which move from one place to another, are very various. A great number, like the oyster, are perfectly stationary, and do not, when once fixed, move from the place they have selected; there are, however, several genera that are continually moving about, and various and beautiful are the contrivances by which they effect this object. Many move along the surface of the ground or bottom of the sea, by means of their foot, which they thrust out to a distance in advance, and fix to some solid object, after effecting which, a strong muscular contraction enables them to draw their body to it; it is then again protruded in a similar manner, and by this means, the animal moves slowly: others, using an action the reverse of this, push backwards with the foot, and thus impel themselves forward, and others, still however making use of the

* From *fluvius*, Lat., *a river*.

† From *terrestris*, Lat., *earthly*.

*foot* for the purpose, contrive to advance with considerable agility, by coiling it up tightly, and suddenly relaxing it, by which means, serving as a spring, it urges the body to some distance. There are many species of Mollusca which are unable to move along the rough surface of the ground, but manage to advance rapidly enough along the smooth marine plants, by a kind of sliding motion. Those tribes which do not creep along the ground, but move through the water, are obliged to have recourse to various methods to enable them to swim; some float along the surface, borne as the winds and waves direct; others, by squirting out suddenly a stream of water, which they have taken into their shells, send themselves forward in an opposite direction; and others swim, by using their foot as a fin, and moving it from one side to the other. In those Mollusca which affix themselves permanently to a submarine object, the method of attachment varies considerably; some, for instance, are fixed by the shell, some by a continuation of the foot either in a mass, or divided into separate fibres, some by a tube, and others

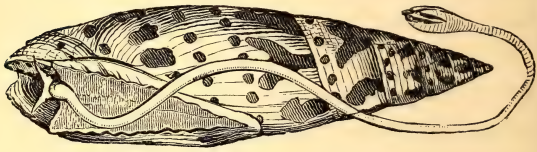
by a number of threads, which they spin and fix to different parts of the rock or other substance on which they dwell. In the locomotive Mollusca the foot is often serviceably employed for the purpose of burrowing in the sand and mud, to enable them to conceal themselves underneath, being used as a scoop with much effect, and thus enabling the animal to hide itself in a short time, and to emerge when all danger is over.

With regard to the *food* on which Mollusca live, there is as great a variety as exists among animals of a more complicated organization: some are carnivorous, or *Zoophaga* *, others herbivorous, or *Phytophaga* †, and the substances on which they feed, whether animal or vegetable, are consumed by them in various states, some preferring the *living*, whilst others prefer the *dead* or *putrescent* form. To meet these different forms of nutrition, various and diversified organs are required; and it will be found that in these animals, as well as in the

* From *zo-on*, Gr., *an animal*, and *phago*, Gr., *to eat*.

† From *phyton*, Gr., *a vegetable*, and *phago*.

other ranks of creation, the appropriate apparatus is adapted in every case. Amongst those which are *carnivorous*, some that have the power of locomotion are furnished with appendages, by which they can capture their prey; others, that are fixed, by producing a slight current, obtain a constant stream of water supplied to their mouths, bringing with



it minute animals, which they retain. The mouth of the former is usually in the form of a proboscis, which is furnished with little hooks, with which they can penetrate the shells of those they feed on, and extract the contents. Those which are *herbivorous*, cut and masticate their food. In many cases they are provided with a single tooth, which they fix upon the substance they are about to devour. Many have teeth acting

in various ways, but of these the headless Molluscs are destitute.

Having thus given a short general description of the animals inhabiting shells, the next object of inquiry is the formation of *shell* itself. "The molluscous animals are *oviparous*, producing their young from eggs in the same way as birds, although many of the tribes do not, at the time of their exclusion, abandon them at once, but deposit them between the two membranes of the branchial laminæ, where they undergo a species of incubation."* "The animal has a small portion of shell attached to it, even before the egg is hatched: while enclosed, the shell is generally of a pale horn colour, and destitute of markings; when, therefore, they remain attached to the apex of the spire of adult shells, they may be easily distinguished by their appearance from the part formed after their exclusion."† As the animal increases in bulk, it finds the shell is not sufficiently large to cover it, and it then adds to its

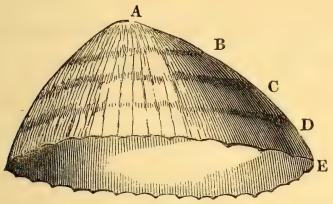
* From the Penny Cyclopædia, article *Conchifera*.

† From Mr. Gray, Philosophical Trans. 1833.

dimensions by the aid of its *mantle*. This portion of the body of the animal, as before mentioned, has the power of exuding a liquid matter, which, on exposure to the air or water, becomes shell, and the mollusc makes the addition to its original habitation by protruding the mantle beyond the edge, and suffering it in that manner to remain exposed: in a short time it is found to be covered with a fluid which has been secreted, and this gradually and slowly assumes consistence, fresh layers being added within, each projecting a little farther at the edge, and thus the new formation becomes similar to the shell already in existence. This operation is repeated at intervals, as the animal increases, so that by this beautiful contrivance the shell and its inhabitant are always adapted to each other, and preserve their relative proportions.

As the new portion of shell is always similar in shape, and, in fact, takes its form from that part of the mantle which is pushed out, it is evident that the conformation of every shell will depend upon the manner in which the Mollusc protrudes its mantle, and that it will

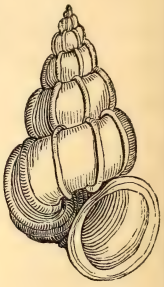
be spiral, cup-shaped, or otherwise, according to circumstances. This can be best explained by a few references: thus, the simplest form of shell is that of the *Limpet*, which has a very small portion (represented at A in the figure),




formed at the period of its birth; as it increases in size, and finds this inadequate to protect its body, it expands the border of its mantle, and, by the process already described, enlarges its shell all round, until it presents the appearance of A B; in like manner, at different periods, as its growth requires, it enlarges it to C, D, and E, at which time, having attained its full size, it ceases to require any farther enlargement, and the shell is then completed or mature.

The *Limpet* presents the most simple method of growth, as in it the mantle is extended equally at every part of the circumference of

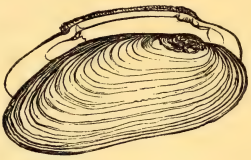
the original shell, and the *size* merely is increased, still preserving the same shape; in the greater number of univalve shells, however, the method of enlargement is different, the mantle being more active on one side of the aperture than on the other: this gives rise to a *turbinated* or *spiral* shell, in which each successive portion of the spire, which forms an entire circle, is called a *whorl.* A shell of this nature is here shown. The new formations in this genus can easily be traced, each ridge represented consisting of a thick lip, which, at certain periods of its growth, the animal has formed at the edge of the shell then existing. These spiral shells are almost always formed with the whorls turning towards the *right,* which arises from the *left* side of the mantle being the most active, in consequence of the position of the heart and blood-vessels of the animal on that side*: in a few genera, however,



* Dr. Grant makes the following observations on this subject, in his *Lectures on Comparative Anatomy,* at the

the heart is situated on the *right* side, and then the whorls of the shell are turned to the *left*, and the shells in which this conformation takes place are called *reversed*, or *sinistral**, in opposition to the common, or *dextral*. †

The growth of bivalve shells is carried on in the same way, each valve being simultaneously enlarged, as will be seen in the annexed figure, where the additions may be easily traced.



London University:—"I am inclined to ascribe this spiral twist of shells to the action of the heart and the respiratory organs, which are situated on the left side, and to the descent which the foot of the animal makes over the columella, in order to reach a solid surface to creep upon. The dilatation of the heart bends the anterior free part of the body to the right side, and would cause the shell to revolve on the same plane, were that cause to operate alone; but the constant descent of the foot over the surface of the pillar causes the plane of revolution to change at every instant, and by these two causes the spiral form of shells appears to be produced."

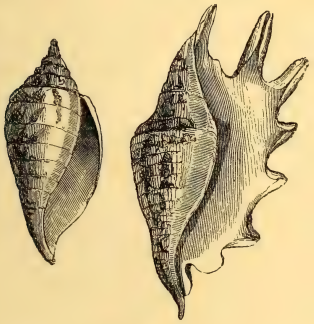
* From *sinister*, Lat., *left*.

† From *dexter*, Lat., *right*.

The power of forming shell does not appear to be confined to the *edge* of the mantle, but exists throughout its whole extent: this has been proved by removing part of the shell of a living snail, at a distance from the edge or lip: the animal immediately sets about filling up the gap, and effects it in the course of a few days by a succession of thin strata of liquid shelly matter, which exude from that portion of the mantle which has been laid bare.

The regularity of the growth of many shells appears to be interrupted at particular times by changes which arise in the shape of the mantle; this is observable in several species, which exhibit cones or spines projecting from their surface, and which have been produced by the mantle altering its form, and dividing into several long slender branches. On these processes shell is formed, constituting a row of hollow spines, which are gradually filled up by successive depositions of shelly matter, and eventually become solid; the mantle being then withdrawn from them, proceeds in the formation of new shell, branching out at regular intervals into another row of spines; and in this

manner are produced the prickles, ridges, and other excrescences visible in many genera, the *Murex*, for example. Analogous to these variations in the deposit of shell by the mantle, but differing, inasmuch as they only occur at one period, are the developements which take place when the mollusc has arrived at its full growth. In the cut are represented the immature and

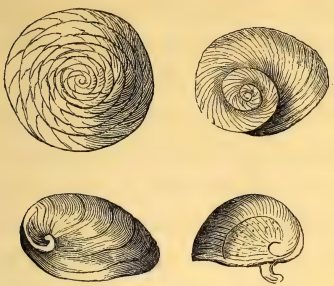


mature states of the same shell. It will be seen that they differ widely; and the variation has been caused by the mantle forming the extension of shell with its accompanying projecting tubes, as a completion to the animal's habitation: it marks the termination of its labours, for the shell having now become perfect, and

the mollusc having arrived at its full growth, the secretion of shell is no longer required to be called into action for the purpose of increasing the size of its habitation; and from this period the animal, if it continue to produce shell, only adds to the thickness and polish of its mansion, without extending its dimensions. "It should be added, that all shells whose spires are exposed, and, being thin in their young state, would be liable to be broken off by the action of the sea, have that part strengthened by the internal deposition of shelly matter. Some few shells, however, as the *Bulimus decollatus*, for instance, lose the upper part of their spire; for the animal, instead of lining the upper whorls, withdraws its body from them, and forms a division: the communication of the body and the *apex* of the shell being cut off, the latter part decays in the manner of a dead shell, and falls off in particles."*

Many of the turbinated or spiral univalve Mollusca have the power of forming an additional protection to their bodies, by construct-

* From Mr. Gray, Philosophical Trans. 1833.



*Opercula.*

ing a kind of door, called the *operculum**, or *epiphragma*†, to the entrance of their shell. These are made more or less strongly, as circumstances require; some, as the snail and other land species, merely needing this extra covering during severe weather, at the end of that time throw it off, and on a recurrence of the necessity make another; these being, therefore, of a temporary nature only, are slight and easily formed, but there are other genera which have them permanently attached, and of a more solid description‡: these latter are fixed to the *foot*

* From *operculum*, a *cover* or *lid*.

† From *epiphrasso*, Gr., *to stop up*.

‡ The temporary clausilia, or doors, are called *epiphragmata*, the permanent, *opercula*.

of the animal, and are enlarged in size by the mollusc, as the shell is increased, in order that they may correspond with and close the aperture. They are found attached to the animal before the egg is hatched. In the foregoing figure are delineations of several varieties of *opercula.* Some are shelly, and others of a horny construction.

The beautiful and varied *colours* which shells present are produced by colouring matter contained in the pores, which exist in *the front part only* of the mantle, and which matter is made to penetrate the substance of the shell before it becomes hardened: the experiment before mentioned* will serve also to exemplify this. The portion of shell of which the animal has been deprived (and this may be done without injury to the snail,) will be reproduced by the action of the mantle, but the colours will be different according to the situation of the part of the shell which has been broken: if the piece be removed and reproduced *at the external lip* of the shell, where the front part of the mantle lies, the natural colours will appear in

* See page 16.

the new piece; but if the fracture has been made *at a distance from the aperture*, and in the body of the shell, a new portion will indeed be made by that part of the mantle which has been laid bare, but it will be white or nearly colourless; thus proving, that, although every part of the mantle can produce shell, *the external edge* alone can infuse colour into it. The brilliancy of the colours observed in shells is exceedingly influenced by the degree of health, and by the food, light, and heat which the mollusc has had the power of enjoying. Those which inhabit tropical countries have often a very great degree of brilliancy and beauty; whilst others which are less favoured by climate, and, still more remarkably, those which remain all their lives enclosed in wood, chalk, &c., have little or no colour. It is observable, also, in a similar manner, that a great difference frequently exists in the *size* of mature shells of the same species, particularly in such as have the strongly marked lip, or other final appendage: this may be accounted for by the strength or weakness of constitution existing in

different individuals, influenced undoubtedly by favourable or unfavourable situations, and abundance or scarcity of food. But this opinion can only be satisfactorily proved or disproved when shells are better known. Mr. Gray has the following remarks on the subject: — "The *thickness*, *roughness*, or *smoothness* of shells appears to depend in a great degree on the stillness or agitation of the water which they inhabit. Two specimens of the same species of shell will often be found very different in appearance, according to the situation in which they have been placed. For instance, the common *Buccinum* of our coast is thick, solid, and heavy, when found in a rough sea, and thin, light, and smooth, when found in the still water of harbours. Boring shells are generally influenced in regard to their size, thickness, and form, by the hardness or softness of the rock in which they are found. Land shells are much influenced, as regards their size, by their temperature, altitude, and abundance of food. The shells of *Helix nemoralis*, and *Helix hortensis* found near London, are not above two thirds of the size of

those which occur in Portugal and the south of France."*

Of the *uses* and *benefits* derived by man from shells and their inhabitants, a hasty mention may be made. First, as to their *inhabitants;* amongst civilised nations many species are highly prized as articles of food, such as the *oyster*, *mussel*, &c.; and among savage nations, particularly those inhabiting the coasts of Western Africa and New Holland, a great part of their food is derived from Mollusca of various kinds. Their principal use, however, in this respect appears to be, the serving as food for the classes of animals more immediately above them in the scale of organization, such as the amphibious mammalia, sea-birds, and fish, which in a great measure live upon them, destroying such vast quantities, that it is their extraordinary fecundity alone which prevents them from being totally annihilated. A silky thread is produced by the *Pinna*, which may be spun, and is occasionally made into gloves, &c., but more as a curiosity than for any useful

* Philosophical Trans., 1833.

purpose; and from several species of Mollusca may be procured a strong colouring matter of a purple hue, which formerly was used as a dye, but has now been supplanted by other animal, mineral, and vegetable productions, which are easier of access. Secondly, as regards the *shell;* in many countries, particularly in China and Japan, the valves of some of the genus *Placuna*, which are extremely thin and semi-transparent, are used instead of glass, to serve as windows. Lime may be burned from a great many varieties, and is so procured, in America and elsewhere, particularly in Holland, where many vessels are employed in fishing for shells, which are afterwards brought to Haarlem, where the lime-kilns are situated. In the Hebrides, Antilles, and many other islands, no other lime is known than that procured from shells. Some shells are used as money in different countries, particularly the *Cypræa;* and in conclusion, pearls and mother of pearl, both the productions of this class of animals, are well known valuable and beautiful objects.

To counterbalance in some measure these benefits which are derived by mankind from

Mollusca, there are some which are *injurious*, but to no very serious extent: snails and slugs do much damage in our gardens by their voracity; and many of the marine species, which make their residence in wood and stone beneath the surface of the sea, occasionally do us much damage, by boring into dikes, piers, and even ships.

Having thus given an outline of the nature of *Mollusca*, or, in other words, of *shells and their inhabitants*, in order that the reader might be able to form a general idea of them, it is now time to enter into their classification and arrangement into different orders and genera, so that he may have the power of becoming more particularly acquainted with them, and of deciding upon the nature, habits, and peculiarities of any shell, and the mollusc which has resided in it, by a simple inspection of its form and appearance. It is to be observed, that it is rarely indeed that the *animal* is to be met with in collections, the shell only being retained as an object worthy of preservation, and, consequently, he will have to be guided in his researches by the latter alone.

*Mollusca* are divided into two great *classes*, *Univalves* and *Bivalves*: the first comprising all those whose shells are formed of one single valve or piece, as the *snail*, and the latter, those which have shells consisting of two valves, or distinct pieces, as the *oyster*. Each of these classes is again divided into *orders*, each order into *families*, each family into *genera*, and each genus into *species*. These will be treated on in succession, according to a systematic arrangement, extending as far as the different *genera*: the limits of this work, which is intended but as an introduction to the science, will not allow of a description of each *species*, and a mere dry list of their names would be uninteresting. Reference can easily be made by the reader, who has mastered the subject as far as it will be pursued here, to the many large and scientific works which have appeared, in which each *specific* variety is introduced: that they would extend these remarks much beyond a short treatise, is evident from the circumstance that one genus alone, the *Helix*, or snail, comprises nearly 250 different species.

The classes *Annulata* and *Cirrhipeda* form

the ninth and tenth of Lamarck's system of animal nature, the *Conchifera*, or *Bivalves*, and the *Mollusca*, or *Univalves*, being the eleventh and twelfth. The two former will be described (though the animals are not considered as possessing true shells) on account of specimens of the tubes or coverings being frequently found in collections of shells. Lamarck arranges his system in a regular succession, beginning with the inferior animals, and describing them in order as they gradually increase in powers and complicated formation. On this account the *Annulata* and *Cirrhipeda* come first, the animals forming those coverings being very inferior in organization to those of the other classes.*

* The information contained in this chapter is chiefly derived from Dr. Roget's Bridgewater Treatise, Mr. Gray's article in the Philosophical Transactions for 1833, and various articles in the Penny Cyclopædia, &c.

# PART I.

## ANNULATA.*

LAMARCK has divided his class *Annelides* into three parts: as the animals of two of these do not form any covering to their bodies, they will not be described here; but the third division, namely, the *Sedentaria*, will be admitted, inasmuch as specimens of the tubes they form are often met with in collections of shells.

The animals of the tribe *Annulata sedentaria* are soft, elongated, and worm-shaped, inhabiting a tube which they never entirely quit. The body has either transverse segments or wrinkles; the head, eyes, and antennæ are sometimes deficient, and they have no feet, but are furnished with retractile knobs, in lateral rows. They are usually found attached to marine substances, and inhabit tubes, either membranous or horny, more or less encrusted

* From *annulus*, Lat., *a ring*.

with grains of sand or fragments of shells, or solid and calcareous: there are 4 families, and the greater part of them are carnivorous.

### Family 1. — *Dorsaliadæ.* *

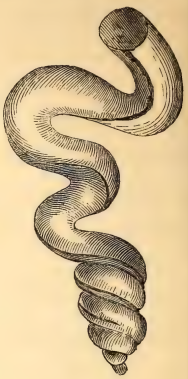
The *branchiæ* of the animals of this family are disposed lengthwise on the body; there are 2 genera: —

1. Arenicola. This genus is found on the sandy shores of Europe, and is much used as a bait for fish. "The animal bores for itself a passage through the sand, and secures the sides of the passage from falling in by applying to them a glutinous cement, which unites the particles of sand into a kind of wall or coating. This covering does not adhere to the body, but forms a detached tube, within which the animal moves with perfect freedom, and which it leaves behind it as it progressively advances; so that the passage is kept pervious throughout its whole length, by means of the lining, which may be compared to the brickwork of

* *Les Dorsalées*, Lamarck.

the shaft of a mine or tunnel." *—There is but 1 species.

2. SILIQUARIA. *Tube*, irregularly twisted, tapering towards one end, which is sometimes spiral; the other end open, and a longitudinal fissure throughout its whole length. *Animal* very long and spiral, head distinct, having two small tentacula, with eyes at the base. — 7 species. †



Some naturalists consider this animal to come under the class Mollusca, and not Annulata. M. Audouin has examined the animal of one recently found in India, and appears to be of the same opinion. It is found also in the Mediterranean, near Sicily.

* Dr. Roget's Bridgewater Treatise.

† So many additions are made almost daily to the number of *species* of Mollusca, that those which are mentioned under each genus must only be taken as the number of well established species known at a certain period. Almost all those which are mentioned in this work are described by Lamarck and Deshayes in *Les Animaux sans Vertèbres*.

FAMILY 2. — *Maldaniadæ.**

The *branchiæ* which this family possesses are in the form of long filaments, which, as well as the head, are enveloped in the mantle. — There is only 1 genus.

3. CLYMENE. *Tube,* slender, open at both ends, the exterior encrusted with sand and pieces of shell. — There is only 1 species, which inhabits the shores of the Red Sea.

FAMILY 3. — *Amphitritidæ.*†

The *branchiæ* are disposed near the anterior part of the body; the tube is membranous or corneous, and is more or less covered with sand. — This family consists of 4 genera.

4. PECTENARIA. *Tube,* membranous or papyraceous, in the form of a reversed cone, the

* *Les Maldanées,* Lamarck. Lamarck placed here the genus *Dentalium,* which is now proved to be a mollusc, and will be described in its proper place.

† *Les Amphitritées,* Lamarck.

exterior covered with sand. — There are 2 recent species.

This animal inhabits the seas of Europe and India, and is not confined to one spot.

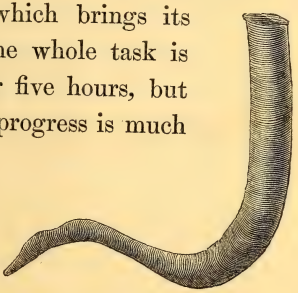
5. SABELLARIA. *Tubes*, numerous, united into a common mass, composed of agglutinated fragments of shell and sand; the orifices are cup-shaped. — There are 2 recent species.

It is found on rocks on the coasts of Europe.

6. TEREBELLA. *Tube*, elongated, cylindrical, thin, and pointed at the base, membranous, and having grains of sand, and fragments of

shell adhering all round it; it is open only at the apex. — There are 3 recent species. This animal inhabits the Northern Seas. Dr.

Roget* gives an interesting account of the manner in which these little creatures form their tubes: — "If taken out and placed in water upon sand, its actions may be observed. It immediately drags towards its head fragments of shells, and larger particles of sand, where they are cemented together by the glutinous matter which exudes from that part of the surface. It has soon formed a kind of collar, which it lengthens at every part of the circumference. Having formed a tube of half an inch or an inch in length, it proceeds to burrow, and as it proceeds avails itself of the materials, till the whole tube is completed. The Terebella then turns itself in its tube, so that the head is next to the surface, ready to receive the water which brings its food. In summer the whole task is completed in four or five hours, but in cold weather the progress is much slower."



7. Amphitrite. — *Tube* cylindrical, membranous or co-

* Bridgewater Treatise.

riaceous, thin towards one end, generally with adhesions.—There are 8 recent species.

The Amphitrite inhabits the coasts of Europe, Jamaica, &c.

### Family 4. — *Serpulidæ.**

The *branchiæ* in this family are separated or covered by an operculum. The tube is solid and calcareous. — The genera are 4.

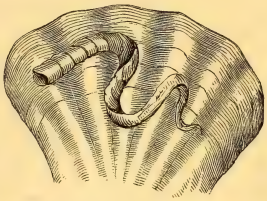
8. Spirorbis. — *Tube* testaceous, turned spirally on a horizontal plane, the lower part of which is attached to marine substances; the opening is round or angular. — 16 species, recent and fossil.

This little spiral tube is frequently seen on the fuci found on the shore, and also on shells or other marine bodies. It is often found in great numbers, but each individual is isolated.

9. Serpula. — *Tube* solid, calcareous, irregularly twisted, fixed, the aperture round and smooth. — 60 species, recent and fossil.

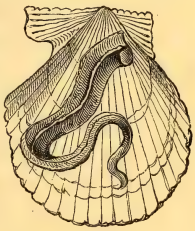
* *Les Serpulées,* Lamarck.

These tubes are fixed by the lower extremity, or more completely by other parts, to marine substances, and are either grouped or solitary. The greater number of species are found in the seas of Europe. The animal feeds on aquatic animalculæ.



10. VERMILIA. — *Tube* testaceous, cylindrical, gradually lessening at one end, more or less twisted, and fixed at the base to marine substances. Aperture round, and having several teeth. — There are 8 recent species.

The tube of the *Vermilia* is said to have a convex, orbicular, and sometimes conical operculum. It is found on stones, shells, fuci, &c.



11. GALEOLARIA. — *Tube* testaceous, cylindrical, rather angular, fixed at the base, with the other end raised. Aperture orbicular, and formed of from five to nine little valves on the upper side, the whole

of them attached to the edge of the operculum on one side only. — 1 recent and 1 fossil species.

This tubular animal is found in New Holland.*

## PART II.

### CIRRHIPEDA.†

THESE animals are soft, destitute of head or eyes, testaceous, having the body fixed, and furnished with a mantle; they have also tentacula, with curled tufts. The number of arms varies, and they are unequal in size; the shell is either sessile or elevated on a flexible pedicle, and is composed of several valves, sometimes moveable, sometimes fixed.‡ They are divided into two families.

* *Magillus*, a genus placed here by Lamarck, is now found to be of the class *Mollusca*, and is described in the fourth part of the work.

† From *cirrus*, Lat., *a curled tuft of hair*, and *pedes*, *feet*.

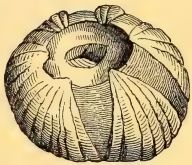
‡ "All these animals are oviparous. As soon as the young one comes forth, it attaches itself to the nearest body by secreting shelly matter." — Reeve's *Conchologia Systematica*.

FAMILY 1.—*Cirrhipeda sedentaria.**

The body of the animal possesses no pedicle, and is enclosed in a shell fixed to marine substances.—There are 6 genera.

12. TUBICINELLA.—*Shell* univalve, operculated, tubular, erect, slightly thinner towards the base, having annular transverse ribs, truncated at both ends, open at the summit, and closed at the base with a membrane. Operculum with four obtuse valves. *Animal* rather cylindrical and long.—1 species only.

This shell is found buried to the depth of several inches in the fat of the South Sea whale; its operculum and the upper part of the tube being visible.



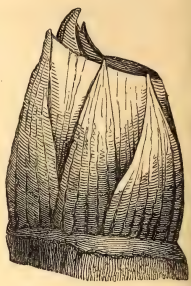
13. CORONULA.—*Shell* rather orbicular, conoid, the extremities truncated, the sides very thick; inside hollowed into radiating cells.

* *Cirripèdes Sessiles*, Lamarck.

Operculum composed of four obtuse valves. *Animal* rather flat. — 4 recent species.

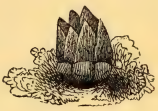
This genus, like the last, fixes itself on the backs of whales, turtle, and other marine animals, and likewise on stones and large shells.

14. Balanus. — *Shell* conical, summit truncated, closed at the base by a solid testaceous substance, by which it adheres. Aperture rather triangular. Operculum internal, and having four valves. *Animal* either flattened or almost cylindrical. — 39 species, recent and fossil.



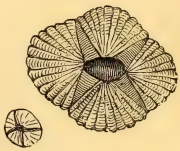
Some of the species of this genus are armed with spines on the outside. They are found in all seas, covering the rocks, and pressing close together, so as in many instances to alter their form. In Chili they are found five inches and a half long, and half an inch in diameter, and are highly esteemed by the natives as an article of food. When boiled, and eaten cold, the flesh much resembles the crab, and is equal to it in richness and delicacy.

15. ACASTA. — *Shell* oval, rather conical, composed of pieces which can be separated. Cone formed of six unequal valves united together, the base an orbicular valve, concave on the inside, resembling a small cup. Operculum formed of four pieces. — 4 recent species.



These animals are found lodging in sponge, and are never attached to hard bodies. They inhabit tropical seas.

16. CREUSA. — *Shell* orbicular, having four valves, which are unequal and united together. Operculum internal, and consisting of four valves. *Animal* rather globular, and having three or four pair of arms. — 4 recent species.



These small shells are found affixed to madrepores, and other substances in the Northern and Indian Seas.

17. PYRGONA. — *Shell* rather globular, ventricose, convex above, apex perforated, aperture small, and

oval. Operculum consisting of four valves.* *Animal* unknown. — 3 recent species.

Found in madrepores.

Some modern writers have introduced into this family several new genera, but as the distinctions are founded upon characteristics of secondary importance, they will not be described in these pages.

### Family 2. — *Cirrhipeda pedunculata.*†

The body of the animals of this family is supported by a tubular peduncle, flexible and tough, the base of which is affixed to marine substances. The shell is variable in form, but always composed of several valves.—There are 6 genera.

18. Lithotrya (Sowerby). — *Shell* irregular in form, compressed and pyramidal, consisting of eight unequal pieces; having at the base an irregular cap-shaped appendage, like the inverted shell of a Patella, and to which the lower part of the

* Some authors say only two.

† *Cirripèdes Pédonculés*, Lamarck.

peduncle is affixed. *Animal* compressed. — 1 (?) species.

These animals are always found fixed to the bottom of a deep irregular cavity in limestone, perforated by themselves.*

19. ANATIFA.† — *Shell* compressed at the sides, composed of five valves, which are con-

tiguous and unequal; the two side-pieces are rather striated, the others small, and all are united together by a thin membrane. *Animal*

* Reeve's Conchologia Systematica.

† Called by Leach *Pentelasmis*.

very flat, enclosed in a thin mantle; peduncle often very long. —10 recent species.

These curious but common shells are found in all seas, particularly on the coasts of Africa. They are affixed to marine bodies, generally in numerous groups, and the peduncle is sometimes found a foot long. The inhabitants of Goree eat a large species of Anatifa, which is considered a great delicacy. Some species live at a distance from each other, others are often united in large masses; they prefer a situation where the sea is much agitated.

" The Anatifa, as well as the other genera of this tribe, are found attached to ships, logs of wood, bottles, corks of nets, fuci, floating testaceous Mollusca, (the Iantha, for instance,) and even on whales, turtles, and serpents. A large log of timber covered with these animals, twisting and diverging in all directions, and so thick as entirely to hide the surface of the log, is a strange sight. They look like an enormous collection of serpents to the ignorant; and a living mass of this description, casually thrown into shallow water, and left by the tide, has been so termed. Their growth must

be exceeding rapid. A ship going out with a perfectly clean bottom, will often return, after a short voyage, covered with them."*

20. SCALPELLUM (Leach).—*Shell* composed of thirteen unequal pieces, twelve of which are lateral and very much flattened or compressed, and one of which is dorsal, elongated, and acuminated at the base. They are all united together on the integument, and the peduncle is covered with small scales. Animal resembling the Anatifa. —2 species.

21. POLLICIPES. — *Shell* compressed at the sides, valves rather contiguous, unequal, thirteen or more in number, the lower side valves the smallest; peduncle short and wrinkled. *Animal* like the Anatifa. — 10 species, recent and fossil.

Found in the Northern and European Seas, in groups upon rocks.

22. CINERAS. —*Shell* composed of five testaceous oblong valves, separate, and not cover-

* Penny Cyclopædia, art. *Cirrhipeda.*

ing the whole of the body, two at the sides of the aperture, the others on the back. They are enclosed in a membranous bag, a continuation of which forms the peduncle. *Animal* rather compressed, peduncle thick.—1 recent species.

This genus is found near the coasts of Senegal, and also in the Northern Seas. It attaches itself to buildings covered by the sea.

23. Otion. *Shell* composed of five small testaceous valves, adhering near the sides of the aperture, enclosed in a membranous bag, but terminating in two tubes at the back; the centre aperture admits the passage of the tentacula. —4 species.

Found in similar situations to the last genus.

[*To face page* 45.]

*Animal.* Soft, without either head or eyes, and having the mouth concealed. A large mantle envelopes the whole of the body, which is entirely or partially covered by a bivalve shell.

# CONCHIFERA.—BIVALVES.

DIVIDED INTO THREE ORDERS.

*Shell* always bivalve, the valves mostly joined together by a hinge or ligament. Sometimes free, sometimes fixed.

## 1. BRACHIOPODA.

*Animal*, depressed, circular, or oval.
*Shell* having no ligament to unite the valves, but a pedicle by which the shell is united to other substances.

TWO FAMILIES.

1. TENDINOSA. (*Shell* attached by a pedicle.) *Lingula, Terebratula.*
2. ADHÆRENTIA. (*Shell* attached by one valve, as well as a pedicle.) *Thecidium, Crania, Orbicula.*

## 2. DIMYARIA.

*Animal* attached to its shell by *two* muscles, which are at a distance from each other, and near the sides of the shell.
*Shell* having *two* muscular impressions in each valve.

FOUR DIVISIONS.

1st Division, CRASSIPEDA. *Shell gaping.* 4 Families.

1. TUBICOLIDÆ. (*Shell:* valves either enclosed within a testaceous tube; encrusted entirely or partially in its substance; or projecting outwardly. Marine, and boring into wood, stone, and sand.) *Aspergillum, Clavagella, Fistulana, Gastrochæna, Teredo.*
2. PHOLADIDÆ. (*Shell* without a tubular sheath, but provided with accessary pieces, distinct from the valves. Marine, boring into stone, &c.) *Xylophaga, Pholas.*
3. SOLENIDÆ. (*Shell* transversely long, gaping only at the ends, ligament external. Marine.) *Solen, Solecurtus, Pholadomya, Panopæa, Glycimeris, Solemya.*
4. MYIDÆ. (*Shell* having a large spoon-shaped tooth in one or both valves, to which the ligament is attached, gaping at one or both ends. Marine.) *Mya, Anatina, Thracia, Corbula, Pandora, Anatinella.*

2d Division, TENUIPEDA. *Shell gaping slightly.* 3 Families.

5. MACTRIDÆ. (*Shell* most frequently gaping at the sides; ligament internal; valves equal. Marine.) *Lutraria, Mactra, Crassatella, Mesodesma, Erycina, Ungulina, Amphidesma.*
6. LITHOPHAGIDÆ. (*Shell* more or less gaping on one side; ligament external. Marine.) *Saxicava, Petricola, Venerupis.*
7. NYMPHIDÆ. (*Shell* with at most two cardinal teeth in the same valve, gaping often slightly; ligament external; callosities at the hinge projecting. Litoral.) *Sanguinolaria, Psammobia, Galeomma, Tellina, Corbis, Lucina, Donax, Capsa.*

3d Division, LAMELLIPEDA. *Shell closed.* 4 Families.

8. CONCHIDÆ. (*Shell* having at least three cardinal teeth in one valve; as many or less in the other; sometimes lateral teeth. First three genera fluviatile; the rest marine.) *Cyclas, Cyrena, Galathea, Cyprina, Astarte, Cytherea, Venus.*
9. CARDIIDÆ. (*Shell* having irregular cardinal teeth, and generally one or two lateral; usually ribbed; heart-shaped; some slightly gaping. Marine.) *Cardium, Cardita, Cypricardia, Isocardia.*
10. ARCIDÆ. (*Shell* with small cardinal teeth, numerous, and arranged either in a straight or arched line; ligament external. Marine.) *Cuculæa, Arca, Pectunculus, Nucula, Trigonia.*
11. NAIIDÆ. (*Shell* generally no teeth, or with an irregular, simple, or divided cardinal tooth, and a longitudinal one; or a row of irregular tubercles; ligament external. Fluviatile, with an epidermis.) *Unio, Hyria, Anodonta, Iridina.*

4th Division, AMBIGUA. *Shell closed.* 1 Family.

12. CHAMIDÆ. (*Shell* inequivalve, affixed to other bodies; one large tooth or none. Marine or fluviatile.) *Diceras, Chama, Etheria.*

## 3. MONOMYARIA.

*Animal* attached to its shell by *one* muscle.
*Shell* having *one* muscular impression in each valve, near the centre.

TWO DIVISIONS.

1st Division. *Ligament marginal and elongated.* 3 Families.

1. TRIDACNIDÆ. (*Shell* transverse, equivalve, outer margin waved or lobed. Marine.) *Tridacna, Hippopus.*
2. MYTILIDÆ. (*Shell* longitudinal, equivalve, rarely foliaceous. Marine). *Modiola, Lithodomus, Mytilus, Pinna.*
3. MALLEIDÆ. (*Shell* foliaceous, interior iridescent. Marine.) *Crenatula, Perna, Malleus, Vulsella, Avicula.*

2d Division. *Ligament short, and placed under the Boss.* 2 Families.

4. PECTENIDÆ. (*Shell* of a solid substance, generally eared, and ribbed. Marine.) *Pedum, Lima, Pecten, Plicatula, Spondylus.*
5. OSTREIDÆ. (*Shell* mostly foliaceous, inequivalve, rarely eared. Marine.) *Ostrea, Placuna, Placunanomia, Anomia.*

[*To face page* 45.]

*Animal.* Soft, without either head or eyes, and having the mouth concealed. A large mantle envelopes the whole of the body, which is entirely or partially covered by a bivalve shell.

| 1. BRACHIOPODA. | |
|---|---|
| *Animal*, depressed, circular, or oval.<br>*Shell* having no ligament to unite the valves, but a pedicle by which the shell is united to other substances. | *Animal*<br>sides<br>*Shell* ha |
| TWO FAMILIES. | |
| 1. TENDINOSA. (*Shell* attached by a pedicle.) *Lingula, Terebratula.* | 1. TU |
| 2. ADHÆRENTIA. (*Shell* attached by one valve, as well as a pedicle.) *Thecidium, Crania, Orbicula.* | 2. PHO<br>3. SOL<br>4. MY<br>5. MA<br>6. LIT<br>7. NY<br>8. CO<br>9. CA<br>10. ARI<br>11. NA<br>12. CH |

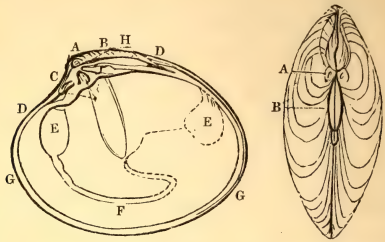
# PART III.

## CONCHIFERA OR BIVALVES.

THE Mollusca inhabiting bivalve shells are chiefly distinguished from the other classes by the absence of a visible head or neck, and the consequent deprivation of the organs of sight and hearing; they possess a mouth, but it is a mere opening in the body, without jaws, teeth, or hard parts. The branchiæ are large, placed on each side, between the body and the mantle. The lobes of the mantle are fringed round the edge with numerous filaments, very sensitive, and irritable to the touch, and which are in constant activity, drawing a current of water within for the capture of their prey, which is supposed to consist of small particles of vegetable and animal substances. None of the genera are terrestrial, their construction not affording them sufficient powers of locomotion for finding their food on land, and confining them to the water, whether salt or fresh, or to the sands on the coasts.

Bivalves are separated into three orders: —

1. Brachiopoda.* 2. Dimyaria.† 3. Monomyaria.‡.




The component parts of a bivalve shell will be understood by referring to the annexed representation, in which A A are the *bosses*, or prominences, which exist near B, the *hinge*, or juncture of the two valves; the latter are also kept together by strong muscles, which proceed from the animal itself, and are attached to each valve on the interior surface. Under the bosses, and inside the valves, are the *teeth*, being little projections that lock into each other, and serve to keep the valves steady when closed; they are divided into *cardinal* §, or principal teeth, C; and *lateral* ‖, or side

* From *brachion*, Gr., *arm*, and *poda*, *feet*.
† From *dis*, Gr., *double*, and *myon*, *muscle*.
‡ From *monos*, Gr., *single*, and *myon*, *muscle*.
§ From *cardo*, *a hinge*. ‖ From *latus*, *a side*.

teeth, D D. E E are the *muscular impressions*, and F the pallial *impression*, which marks the size of the animal, being formed by the border of the pallium or mantle. G G are the *sides* of the shell, which is called an *equilateral* shell when they are equal in length, and *inequilateral* when they are unequal. H is the *ligament*, which is horny, and by its elasticity tends to keep open the valves. This is counteracted at the animal's pleasure, by the muscles attached within the shell. The ligament is sometimes internal, and sometimes external, or both at the same time.

In describing a bivalve shell, both Linnæus and Lamarck place the shell on the bosses, with the opening above and the ligament before; the valves are either called right or left, as they are nearest to the right hand or left hand of the observer.

## Order I.

### BRACHIOPODA.*

Authors have been much divided in opinion about the order *Brachiopoda*, not only as to its

* *Les Brachiopodes*, Lamarck.

divisions, but regarding its right place in the system. Some have placed these shells with the *Cirrhipeda.* Cuvier made them a separate class, but still arranged them next in order. Lamarck places them at the end of the *Monomyaria,* but merely as a division of that order. Deshayes thinks they should form a distinct order, and come before the *Dimyaria:* this plan will be followed here, but the number of genera will be the same as found in Reeve's *Conchologia Systematica;* the plan there pursued appearing more simple than that adopted or explained by other conchologists.

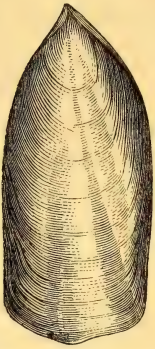
This order is divided into 2 families, distinguished by the mode of attachment.

### Family 1.— *Tendinosa.**

The muscle or pedicle by which these animals are attached to rocks, &c. gives them but a limited sphere of action. —There are 2 genera.

1. Lingula.— *Shell* thin, either horny or calcareous, equivalve, equilateral, somewhat

* From *tendo,* Lat., *a tendon.*



peaked at the apex, generally open at the base, rather acute, somewhat gaping. The valves are destitute of a hinge, being supported by their muscular adhesion. *Animal* having two long ciliated arms, curled up during repose. — 3 recent and 1 fossil species.

Mr. Cumming met with considerable numbers of these shells in the Philippine Islands: their inhabitants are often eaten by the natives, but he does not think them wholesome. They live buried in hard sand, and can only be found at low water.

2. TEREBRATULA. — *Shell* inequivalve, equilateral, oval or orbicular, adhering by a short gelatinous tendon. The upper valve has the apex often curved inwards, and perforated for the passage of the tendon. It has also a single tooth-like process on each side. The lower valve has two slender shelly processes, generally recurved and bent. *Animal* having a ciliated appendage

on each side the body.—16 recent and 98 fossil species.

These animals inhabit great depths, and fix themselves to other objects by filaments or a tendinous cord which proceeds from the hole in the boss. They have a curious kind of internal skeleton, as it may be termed, consisting of a slender, flattened, calcareous loop, with other pieces diverging from it: the arms of the animal seem to be attached to it. They are found in the European seas, those of N. Zealand, and the Southern Ocean.

### Family 2.—*Adhærentia.**

This family attach themselves by the shell; there is still, however, a muscular tendon in most of them, passing through a perforation in the lower valve. The valves are not united by any ligament. The shell is thin, and rather horny than shelly.—There are 3 genera.

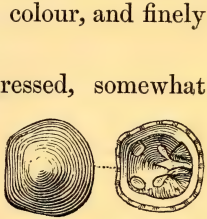
3. Thecidium (Defrance).—*Shell* ovate, small, inequivalve, nearly equilateral, imperforate, and attached by the concave valve, which

* From *adhæreo*, Lat., *to adhere*.

has two short cardinal processes, and a rather irregular space, extending from the hinge to the boss. The upper valve is rather flat, and has a small obtuse appendage near the base, and two processes closely locking into those of the lower valve. *Animal* not known. — 1 recent and 3 fossil species.

From the Mediterranean. The interior of the upper valve is very curious, being indented as if to fit certain parts of the body. These marks spread round in a semicircular direction from the hinge, and look exactly as if they were picked out in wax. The inside of both valves is of a very pale green colour, and finely granulated.

4. CRANIA. — *Shell* compressed, somewhat square, inequivalve, equilateral, the upper valve convex and patella-shaped, the lower flat and attached. The interior of the latter exhibits four very distinct muscular impressions. There are no car-



dinal processes nor any hinge.—1 recent and 4 fossil species.

From the Indian seas. (Lamarck.)

5. Orbicula.—*Shell* horny, orbicular, rather irregular, inequivalve, rather compressed, the upper valve like a patella, the lower flat. In the centre of the latter is a small oval depression, with an oblique fissure in it for the passage of a tendon; four muscular impressions in each valve. There is no hinge. *Animal* having two short ciliated arms.—4 recent and 2 fossil species.

These shells are found in the Northern Seas, and those of Peru and Chili. The species from Peru is very abundant, the individuals are grouped one on the other, and form large masses.

## Order II.

### DIMYARIA.*

This order contains a great number of families, which may be grouped into four divisions, arising partly out of the more or less perfect manner in which the valves close upon each other, partly from the shape of the foot of the inhabitant. In the *first* division, the valves when shut do not come into contact in all parts of the circumference, but leave a space open at one or both ends; the foot of the animal, also, is large and thick. In the *second* the aperture left is much less, and the foot is small and compressed. In the *third* the contact of every part of the valves is more perfect, and the shells can most of them be completely closed, and the foot is flat or lamelliform. The *fourth* division contains shells of a doubtful nature: the muscular impressions are two, but the shells are fixed to rocks, so that they greatly resemble in that respect the order Monomyaria.

* Called sometimes *Bimusculosa;* the Latin form of expressing the sense of *Dimyaria*. *Les Conchifères dimyaires*, Lamarck.

## Division I. — Conchifera crassipeda.*

*Shell* gaping.

This division contains four families, *Tubicolidæ*, *Pholadidæ*, *Solenidæ*, and *Myidæ*.

### Family 1. — *Tubicolidæ*.†

These singular shells have at first sight no appearance of being bivalves, the two valves being small, and enclosed in a testaceous tube, or encrusted entirely or partially in its substance; they even sometimes project outwardly. They bury themselves in stone, wood, sand, and in other shells. — There are 6 genera.

6. Aspergillum. — *Shell*, tube resembling the spout of a watering-pot, being thicker at one end than the other, the smaller one open, and the larger one closed by a plate, which is perforated with small holes; valves situated near the plate, outside the tube. *Animal* unknown.‡ — 5 species, recent.

* *Conchifères crassipèdes*, Lamarck. *Crassipeda*, from *crassus*, Lat., *thick*, and *pedes*, Lat., *feet*.

† *Les Tubicolées*, Lamarck.

‡ M. Ruppel speaks of the animal of the species *vaginiferum*, from the Red Sea. It appears greatly to resemble that of the *Pholas*.

This very curious shell derives its name from its form, and varies in length from seven or eight inches to a foot; it is supposed by some authors that it attaches itself to the rocks by a byssus passing through the holes in the plate which terminates its tube, but it has generally been found on the sand: its colour is white, with a slight tinge of grey or pale red.

The *Aspergillum agglutinans*, from New Holland, has the disk or plate differently constituted from the other species: instead of the small holes are substituted slender tubes, separate and unequal, with a fissure in the centre. Its specific name is derived from the circumstance of the tube being constantly covered with sand, fragments of shells, and madrepores. The *Aspergillum Javanum*, from New Zealand and Java, is the most common species.

"The row of slender tubes round the disk

are supposed to be filled with fleshy filaments from the mantle. The upper end of the tube, which is rarely obtained perfect, is more or less attenuated, and terminating in smooth undulations, is reflected at the margins. This reflected extremity is left entire at certain periods of growth, and the tube is recommenced according to the necessities of the animal. Some specimens have been found with four or five of these entire reflections."*

7. CLAVAGELLA.—*Shell*, valves very small, the one being placed on the exterior, the other in the interior of the tube, which is narrow and open at one end, club-shaped and spiny at the other. *Animal* unknown. — 2 species recent, and 5 fossil.

There are very few recent specimens of this shell to be met with in cabinets: some have been brought from the Australian and Polynesian islands, and one living individual from the bay of Guayaquil. It perforates stones, corals, and even other shells.

* Reeve's Con. Sys.

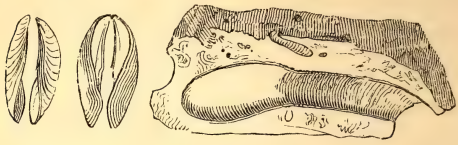
8. FISTULANA. — *Shell,* valves equal, free, and situated inside the tube, which is swollen and closed at one end, but thin and open at the other. *Animal* not well known. — 4 species recent, and 2 fossil.

This genus is found buried in wood or fruits which have been long in the sea, in the thick substance of other shells, and also in the sand. Its locality is the shores of India.

Lamarck here places two genera, *Septaria* and *Teredina,* which modern naturalists think unnecessary. Deshayes unites them to *Teredo.*

Reeve, in his *Conchologia Systematica,* arranges *Gastrochæna* in this family, as it lines with a testaceous tube the cavity in which it dwells. It also forms an unconnected tube for protection when not imbedded.

9. GASTROCHÆNA. — *Shell* equivalve, inequilateral, gaping very widely on one side,



united by a ligament, and having in the interior a small spoon-shaped curvature. The tube differs from that of Fistulana in being nearly divided into two. *Animal* having two tubes and a thick short foot.—3 recent species.

The *Gastrochæna* penetrates and makes its abode in hard substances: it seldom exceeds half an inch in length, and inhabits the coasts of Great Britain, the Isle of France, and America. *G. modiolina* is the English species.

10. TEREDO.—*Shell*, valves gaping, having a long recurved tooth under the boss of each, external and attached to the animal, not to the tube, which is long, irregular, and open at both ends. *Animal* long, worm-shaped, having two little tubes.—2 species, recent.

The *Teredo* is almost the only mollusc which is to any extent injurious to mankind, and this

is owing to the animal forming its abode in wood which it meets with in the sea, such as dead and floating trees, piles, and even ships: it is worm-shaped, and about six inches long. In making its excavations into the wood, which it does by boring into the substance in the direction of the grain, each individual is careful to avoid the tube formed by its neighbour, and often a very thin leaf alone of wood is left between; it also, when a knot occurs in its path, makes a turn to avoid it.

A great proof of the manner in which the operations of this little animal may become prejudicial to us was furnished some time ago (1730) in Holland. In that country a considerable portion of the land and coast is below the level of high water, and in order to prevent the irruption of the sea, immense dikes have been constructed along the shore, formed of large masses of sand, and strengthened by large piles driven into the ground: these piles were at-

tacked by the Teredo, and, on examination, were found to be pierced in all directions to such an extent, that, had it not been for a timely discovery of the mischief, the whole of that part of the country might have been overwhelmed by the sea breaking through the enfeebled and worm-eaten defences.*

Found in the European and Indian seas.

### Family 2. — *Pholadidæ*.†

In this family there is no shelly tube like that which characterises the *Tubicolidæ*, and the animal is contained entirely within the two valves. The distinguishing mark is that the latter gape widely, and have small shelly pieces to unite the hinge, instead of a ligament. From this cause the two valves are scarcely ever found together, except when the shell is taken with the animal alive, as, after the death of the mollusc, the body is soon washed out of the open shell, and the valves having nothing

* Sir Everard Home mentions a species called *T. gigantea*, which sometimes exceeds four feet in length and several inches in circumference.

† *Les Pholadaires*, Lamarck.

to keep them together, separate and are thrown in different directions. There are two genera, *Xylophaga* and *Pholas*, both of which bore into stones, wood, and madrepores.

11. Xylophaga (Turton). *Shell*, valves equal, inequilateral, and very much gaping, very similar to those of *Teredo*. They have no calcareous tube, but two small accessory testaceous pieces placed near the hinge, and one small tooth in each valve, with an internal rib running from the boss to the margin.

These shells are found in light wood or pieces of stick, which the animals penetrate to the depth of about an inch.*

12. Pholas. — *Shell* gaping at both ends, equivalve and transverse, having a flat, recurved, spoon-shaped process in each valve below the bosses, which are close to one end of the shell, covered by a callosity, and also having accessory pieces attached. *Animal* having two small united tubes at one end of the shell,

* Reeve's Con. Sys.

and a foot or short thick muscle, which is flat at the end, at the other. — 10 species recent, and 1 fossil.

These animals inhabit indurated mud or clay, wood, and stone, into which they bore when young, and in which they continue to reside until their death; it is not decidedly known in what manner these soft-bodied animals, inhabiting so fragile a tenement, are able to penetrate hard substances, unless it be by aid of a corrosive agent: they are, from their habits, exceedingly destructive to piers or wooden buildings under water. The breakwater at Plymouth, soon after its erection, was attacked by *Pholades;* it is constructed of limestone.* In order to counteract their operations, nails are closely driven into piles that lie under water, as is the case with the pier at Southampton.

The generality of the species are milky white, and elegantly marked with rows of small prickles: they are not used in this country as food, but on the shores of the Mediterranean, where some large species are

* Penny Cyclopædia, art. *Pholas.*

found, they are not uncommonly eaten. When the animal is irritated, it is said to throw out a stream of water to a considerable distance.

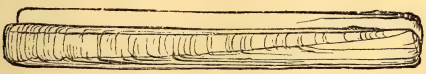
This genus inhabits the European, American, and Indian seas.

The animal is phosphorescent. This fact is mentioned by Pliny, as well as by modern authors.

### Family 3. — *Solenidæ.**

The shells of this family are usually long, gaping at both ends, and having the valves united by an external ligament. The animals do not bore into wood or stone, but bury themselves in the sand. — There are 6 genera.

13. Solen. — *Shell* generally very long, straight, or arched, both ends open, and equi-



valve; teeth small, and varying in number; ligament exterior; bosses small. *Animal* having a short tube, containing two others united,

* *Les Solenacées*, Lamarck.

at one end of the shell, and a cylindrical foot at the other. — 20 species, recent.*

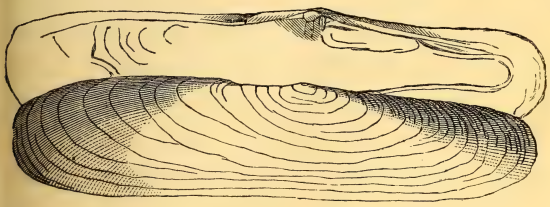
These animals bury themselves in the sand, in which they form holes perpendicular to the surface, occasionally to the depth of a couple of feet, and which they ascend and descend as occasion requires; they are sometimes used as food, but in places where they abound, they are sought after as bait for fish, and are captured in a singular manner. The retreat of the creature having been observed, the fisherman throws into the entrance a small quantity of salt, which quickly causes it to make its appearance, that substance in its pure state appearing to have a very irritating effect upon the animal, although an inhabitant of salt water; as soon as it is visible at the surface, the person lying in wait for it snatches hastily at it, and if he succeeds in grasping it firmly, makes good his capture; should he, however, fail, and the animal escape by gaining its retreat again, the application of more salt produces no farther effect, either from the Solen

* One species is found in the fossil as well as the recent state, and one in the fossil only.

not being sensible to the additional irritation, or perhaps from the instinct of self-preservation causing it to suffer the inconvenience in preference to running the risk of capture: in this case, the only method of securing it is to dig it out of the sand with a spade or other instrument.

Some species are common on the English coast; others come from America, India, &c. One of the Indian varieties is of a beautiful colour; the shell under the epidermis being of a delicate violet, striped with white.

14. Solecurtus (De Blainville). — *Shell* equivalve, ovately oblong, transverse, gaping at both ends, and having the external surface

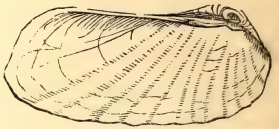


covered with fine undulating lines. Two cardinal teeth in one valve, and one, rarely two, in the other, but not locking into one another

as the Solen. Ligament thick and external. Pallial impression very deeply sinuous. *Animal* larger than its shell; foot large and thick. — 4 species recent, and 2 fossil.

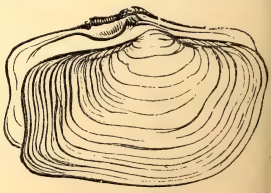
Found in the Mediterranean and Atlantic Ocean.

15. PHOLADOMIA (Sowerby). — *Shell* thin, transparent, white or yellowish, the inside pearly, transverse and oval, inequilateral, and gaping at both ends; hinge having a long narrow hollow or pit; ligament external; bosses worn by being placed near each other. *Animal* unknown. — 1 species recent, and 3 fossil.



There is only one species that is known to be in existence at present, the *Pholadomia candida,* which is found after hurricanes at the island of Tortola; but there are fossil species. The recent species is supposed to be a native of deep seas.

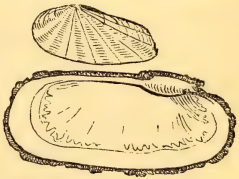
16. PANOPÆA. — — *Shell* equivalve, transverse, broader and shorter than the



Solen, unequally gaping at the sides; one conical tooth in each valve, with a thick callosity on the side; ligament external; pallial impression deep. *Animal* unknown. — 4 species recent, 2 of which are also fossil.

This is a large and handsome shell, but it is not often met with in collections in a perfect state, the valves seldom being found together after the death of the animal: the locality of the genus is the Mediterranean and New Holland.

17. GLYCIMERIS.—*Shell* transverse, possessing no teeth, but thick projecting callosities, and gaping at both ends; ligament external, placed on the short side of the valves; bosses generally eroded. *Animal*, foot small and cylindrical, projecting from one side, and two united tubes, which cannot enter the shell, issuing from the other. — 2 species recent, and 1 fossil.



Found in the northern seas, on sands. It is covered with a thick, black, horny epidermis, passing over the edge of each valve.

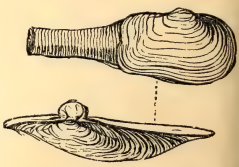
18. Solemya.—*Shell* transverse, equivalve, inequilateral, and blunt at the ends; bosses small; one cardinal tooth in each valve, much compressed and oblique; ligament, both exterior and interior; slightly gaping, and covered by a shining epidermis, which extends beyond the margin. *Animal* having a trunk-shaped foot.—2 species, recent.

From New Holland and the Mediterranean, found in the sand.

### Family 4.—*Myidæ.**

This family is distinguished by having a large spoon-shaped tooth on one or both valves, which are gaping.—There are 6 genera.

19. Mya.—*Shell* strong, thick, and transverse, both ends gaping, a large spoon-shaped tooth on the left valve, and a hollow in the other; ligament internal. *Animal*, a large tube containing two smaller ones proceeds from one end of the shell, and a very



* *Les Myaires*, Lamarck.

small foot from the other.—4 species, recent.

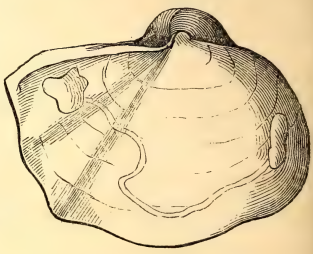
One end of this shell gapes very much, and at the aperture the thick epidermis is lengthened out into a tube, which can be withdrawn at pleasure by the animal. This mollusc buries itself in the sand, allowing the tube just to reach the surface, and by the aid of the smaller tubes contained within it procures its food. It is found on the shores of the European, Asiatic, and African seas, and is used as an article of food in several places; it is also devoured by marine birds.

20. ANATINA.— *Shell* transverse, thin, and almost transparent, gaping at one or both ends, having a spoon-shaped tooth in each valve, and a small moveable appendage connected with the interior of the hinge. The tooth in each valve is supported by a thin small plate; ligament internal. *Animal,* foot tongue-shaped.—10 species, recent.

These shells are found in India, New Hol-

land, Africa, and the European seas; the Indian species is rare, and very beautiful. They are found generally in sands and shallow water.

21. THRACIA (Leach).— *Shell* oval oblong, sub-equilateral, inequivalve, a little gaping at the ends; hinge consists of a more or less prominent spoon-shaped tooth in each valve receiving the ligament. Pallial impression deeply marked. *Animal,* mantle thick, foot rather small and compressed. — 3 species, recent and fossil.



These shells are thin, fragile, and generally covered with an epidermis. They are found in the Mediterranean Sea and on the coast of Senegal.

The two following genera Lamarck had formed into a family and placed after his *Mactracées;* but Deshayes and other authors place them amongst the *Myidæ,* as they agree in all necessary particulars.

22. CORBULA.—*Shell* regular, inequivalve, and inequilateral, scarcely gaping; one cardinal spoon-shaped tooth in each valve, but no lateral; ligament interior. *Animal* unknown.— 9 species recent, 1 of which is also fossil, and 10 fossil only.

These small shells are met with in the seas of New Holland, China, &c., and the European seas; one fine species is brought from South America; some of them are found in the interior of stones, &c., and M. Dorbigny states that some species live in fresh waters.

23. PANDORA.—*Shell* regular, oblong, valves unequal and inequilateral, the upper one flat, and the lower convex; an obtuse, oblong tooth in one valve, and a cavity in the other; ligament internal. *Animal*, foot large and triangular. — 10 species recent, and 1 fossil.

The *Pandora* inhabits the sand at a considerable depth, and is found principally in the European seas; it is also met with in the Per-

sian Gulf and Pacific Ocean. The shells are small, and pearly inside: they bury themselves very deep in the sand, and it requires some exertion to get them out.

24. ANATINELLA (Sowerby).— *Shell* ovate, nearly equal, one end rounded, the other truncated or beaked; ligament internal, inserted between two spoon-shaped processes, one in each valve, and on one side of each are two cardinal teeth. *Animal* unknown. — 1 species (?).

This shell is thin, fragile, and rather pearly inside.

## DIVISION II. — CONCHIFERA TENUIPEDA.*

*Shell* nearly closed.

This division contains three families, *Mactridæ*, *Lithophagidæ*, and *Nymphidæ;* the first family has the ligament internal, and the others external. The foot of the animal is small and

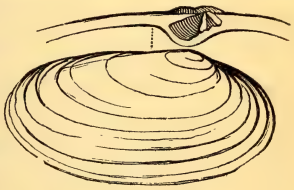
* *Conchifères tenuipèdes*, Lamarck. *Tenuipeda*, from *tenuis*, Lat., *slender*, and *pedes*, *feet*.

compressed, and the gaping of the shells in most instances very inconsiderable.

### Family 5.—*Mactridæ.**

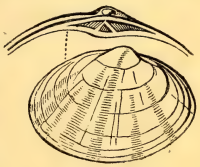
In this family the valves are equal, generally gaping slightly at the sides, and having the ligament placed in the interior. There are 7 genera.

25. Lutraria. — *Shell* equivalve, inequilateral, transverse; two cardinal teeth in one valve, and a triangular pit; no lateral teeth; a spoon-shaped lobe, containing the hinge. *Animal* similar to the *Mactra.* — 13 species recent, some of which are also fossil, and 3 fossil only.



Found in the sand at the mouth of rivers in temperate climates.

26. Mactra.—*Shell* oval, transverse, with thin cardinal and lateral teeth, one of which is shaped like the letter

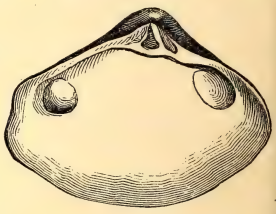


* *Les Mactracées,* Lamarck.

V, and has the point near the boss; valves slightly inequilateral, and gaping a little on each side; bosses protuberant. *Animal*, foot sharp, oval, and long. — 33 species recent, and 3 fossil.

The *Mactræ* live in the sand, and are found in all quarters of the world. This genus includes many rare and beautiful species; the shells exhibit rather a diversity of form, but are generally more or less triangular.

27. CRASSATELLA. — *Shell* equivalve, inequilateral, solid, and heavy, not gaping; hinge very thick; cardinal teeth, two in one valve, one in the other; lateral teeth scarcely seen; a triangular cartilage under the bosses; ligament internal; muscular impressions very distinct. *Animal* unknown. — 11 species recent, and 14 fossil.*

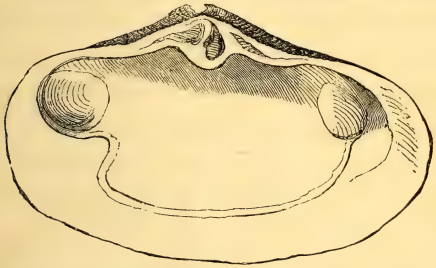


Mature specimens of this shell are very

* Deshayes divides this genus into two, describing seven or eight species under the genus *Crassatella*, and the rest with others under a new genus which he names *Mesodesma*.

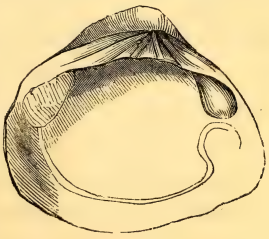
thick; their locality is New Holland and the southern seas.

28. MESODESMA (Deshayes). — *Shell* ovate, transverse or triangular, equivalve, rather compressed, and generally closed; the hinge has two thick lateral teeth in each valve, between



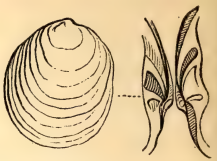
which is situated a deep spoon-shaped cavity for the ligament. *Animal*, foot very flat, quadrangular. — 10 species.

29. ERYCINA. — *Shell* transverse, small, and resembling the Crassatella, but having oblong lateral teeth, and rarely gaping; ligament small, placed in a triangular pit. *Animal* unknown. — 2 species recent, and 10 fossil.



This genus is found in the sand on the shores of New Holland and the Mediterranean.

30. UNGULINA.—*Shell* transverse or almost round; valves nearly equilateral, and not gaping; one bifid cardinal tooth in each valve, and at the side a long pit; no lateral teeth. *Animal* unknown.—2 species, recent.



The exterior of this shell is rayed, and the interior of a reddish colour; it is found in Senegal, New Holland, and the Mediterranean, and the animal perforates rocks, &c. The shells are small, thin, and transparent.

31. AMPHIDESMA. — *Shell* round, or rather oblong, slightly gaping and inequilateral; two cardinal teeth and a long narrow pit between, often lateral teeth; ligament both external and internal. *Animal* unknown.—16 species, recent.

These shells, which are small, are found in the sand on the sea-coasts of tropical countries, and also those of England, Holland, &c.

### Family 6.—*Lithophagidæ.**

This family comprises a small number of genera, which, like the *Tubicolidæ* and *Pholadidæ*, inhabit rocks, stones, &c., into which they bore: they possess an external ligament, and have no tube or shelly pieces uniting the valves, the characteristic mark of the genera mentioned above. The holes they make are tolerably deep, as they conceal nearly the whole of their shell; the entrance is usually small. There are three genera.

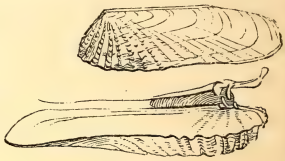
32. Saxicava. — *Shell* transverse, inequilateral, thick, and solid, gaping, rather variable in form; teeth and bosses obsolete or indistinct. *Animal*, foot small, thin, and pointed. —6 species recent, and 6 fossil.

The *Saxicava* perforates and inhabits rocks, oyster-shells, roots of sea-weed, &c., and is known in the South Seas, Mediterranean, Northern Ocean, &c. It appears greatly to

* *Les Lithophages*, Lamarck.

resemble the Pholas in its habits, and is found in calcareous rocks, which it is supposed to pierce by means of an acid. Masses of rock on the coast of England are frequently found pierced with innumerable small holes, the entrances to the habitations of these animals. M. Fleuriau de Bellevue, who has examined this family particularly, finds they are phosphorescent.

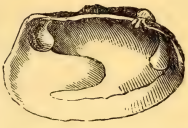
33. PETRICOLA. — *Shell* inequilateral, variously oblong, transverse, and equivalve, no epidermis; hinge furnished with two teeth on one valve, and one or two on the other; slightly gaping. *Animal*, foot small and tongue-shaped. — 11 species recent, and 4 fossil.



Found in many parts of the world in rocks, corals, &c., but most abundant in America. The shell is rather delicate, white, and radiated.

34. VENERUPIS. — *Shell* transverse, inequilateral, striated, and slightly gaping; three cardinal teeth placed close to each other, ge-

nerally in each valve; ligament exterior. *Animal,* foot compressed and long.—8 species recent, and 2 fossil.



The *Venerupis* excavates stones and corals: it is found on the coasts of England, France, the countries washed by the Mediterranean, &c. The colour is a dirty white.

By some authors this genus is not admitted. Sowerby says they do not bore into the rocks, but are merely cast into the cavities in which they dwell, by accident. He unites them to the *Veneridæ,* under the name of *Pullastra.*

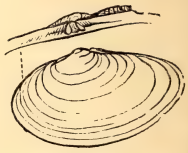
### Family 7.—*Nymphidæ.**

Many of the genera of this family comprise very beautiful shells, being smooth, polished, and tinged with shades of pink, orange, &c. They are usually oblong, and rather more flattened than the preceding families. The ligament is always external, and supported by a thickened hinge-plate, (called a *nympha,* or

* *Les Nymphacées,* Lamarck.

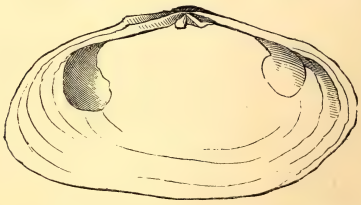
callosity) which often projects, and the valves either do not gape, or so slightly that it is almost imperceptible. There are never more than two cardinal teeth on the same valve, and only some of the genera have lateral teeth. These shells are all *litoral*, and bury themselves in the sand. — There are 8 genera.

35. SANGUINOLARIA. — *Shell* transverse, equivalve, inequilateral, slightly gaping at both ends; hinge having in each valve two teeth approaching each other.



*Animal* unknown. — 4 species recent. From Jamaica, New Holland, the Indian and American seas.

36. PSAMMOBIA. — *Shell* transverse, oval,



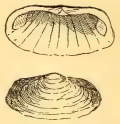
slightly gaping at each end; hinge having two teeth on one valve, and one on the other;

bosses prominent, thin epidermis. *Animal* unknown. — 18 species recent.

This genus presents a good deal of beauty, the shells being often ornamented with lively colours. There are species from the Indian Ocean, North Sea, New Holland, &c.

Here follows in Lamarck's system a genus called *Psammotæa,* which is now discarded: it seems to have been formed on imperfect shells.

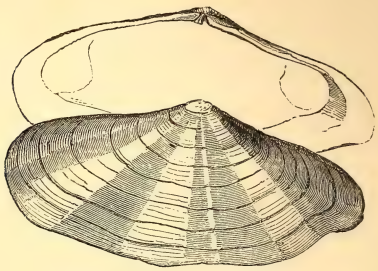
37. GALEOMMA (Turton). — *Shell* thin, equivalve, inequilateral, gaping, one cardinal tooth in each valve; the ligament is small and duplex, partly internal and partly external. *Animal* unknown. — 2 species.



Found in the Atlantic Ocean. A small white and thin shell, covered with waved longitudinal stripes.

38. TELLINA. — *Shell* nearly equivalve, transverse or orbicular, and greatly compressed; the valves on the ligamental side irregularly undulated; cardinal and lateral teeth two, the latter sometimes wanting; ligament on the shortest side. *Animal,* foot compressed and pointed. — 62 species recent, and 16 fossil.

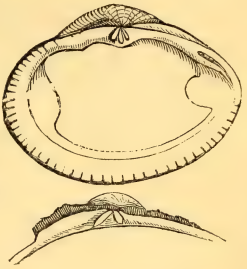
The *Tellinas* are all attractive from their beautiful colour and elegant shape. The ani-



mal has the power of springing to a considerable distance, by folding a portion of its body, and then suddenly extending it; the shell being closed at the same time with a loud snap. They bore into the sand on the sea-shore, and often become the prey of carnivorous shell-fish, as the *Buccinum*, &c. The valves are not always similar, one being occasionally more convex than the other, the colours and bands also differing. They are found in all parts of the world. The valves in some species are much more twisted than in others.

The genus *Tellinides* of Lamarck is now united with *Tellina.*

39. CORBIS. — *Shell* transverse, equivalve, nearly equilateral, bosses curved inwardly, cardinal teeth two, lateral two, one of which is remote. *Animal* unknown. — 1 species recent, and 2 fossil.

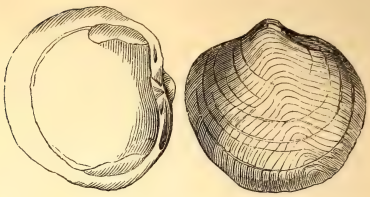


The shell of this genus is thick and solid: there is but one species in a recent state, and that is rare, from India.

This shell may be easily distinguished by the longitudinal and transverse undulations or ridges crossing the external surface of the valves. It is always of a white colour, and tinged with pink occasionally.

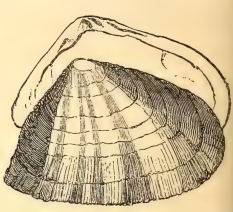
40. LUCINA. — *Shell* nearly round, inequilateral, bosses small and pointed, the outer surface sculptured, cardinal and lateral teeth distinct, but variable in number. *Animal,* foot long and cylindrical. — 19 species recent, and 15 fossil.

From Europe, America, New Holland, &c.



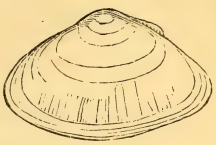
The interior of this shell is often punctured with small holes or *striæ*.

41. Donax. — *Shell* equivalve, inequilateral, transverse, wedge-shaped, cardinal teeth two, on one or both valves, lateral variable, ligament on the shortest side, which is very much flattened or truncated, valves more or less crenulated at the margin. *Animal*, foot compressed, sharp, and angular. — 30 species recent, and 9 fossil.



The *Donax* is found in all parts of the world, buried in the sand of the sea shore; many of the species are beautiful.

42. Capsa. — *Shell* transverse, somewhat triangular, equivalve but rather inequilateral, ligament exterior and on the shortest side, two cardinal teeth on one valve, and one on the



other, none lateral, margins not crenulated. *Animal*, foot compressed and very large. — 2 species recent.

India and Brazil produce this shell, which lies buried at small depths in the sand; it has an epidermis.

The genus *Crassina*, which follows *Capsa* in Lamarck's system, has been removed to the next family, under the name of *Astarte*, which had been previously given to it by Sowerby.

## Division III. —Conchifera lamellipeda.*

*Shell* closed.

This division contains four families: *Conchidæ*, *Cardiidæ*, *Arcidæ*, and *Naïidæ*.

### Family 8. — *Conchidæ*.†

This family is often considered one of the most beautiful amongst the Bivalves. It is composed of shells having three cardinal teeth at least in one valve; but not always lateral

* *Conchifères lamellipèdes*, Lamarck. *Lamellipeda*, from *lamella, a thin plate*, and *pedes, feet*.

† *Les Conques*, Lamarck.

teeth. They are generally orbicular, and closed all round. Three of the genera are fluviatile, have lateral teeth, and are covered with an epidermis. The rest are marine, and have for the most part no lateral teeth or epidermis. There are seven genera.

43. CYCLAS. — *Shell* thin, roundish, or transverse, equivalve, and inequilateral, two small cardinal teeth in each valve, one of which is folded in two, but rather uncertain, lateral teeth lengthened transversely, and compressed, ligament exterior; an epidermis. *Animal*, foot large. — 11 species recent.

The shells of this genus are not larger than a hazel-nut, and some of the species are very thin and transparent, striped transversely with light colours. They inhabit rivers in various parts of Europe and America, and have projecting, not eroded bosses.

44. CYRENA. — *Shell* thick, inequilateral, and round in form, cardinal teeth three in each valve, lateral generally two, ligament external, and on the longest side,

bosses eroded; an epidermis. *Animal* similar to the Cyclas. — 16 species recent, and 11 fossil.

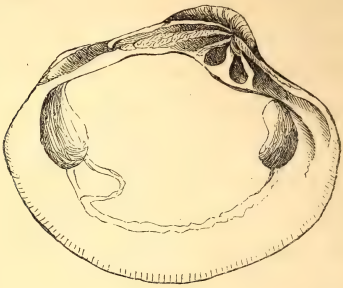
Natives of warm climates, particularly of Asia: they attain a much greater size than the last genus, and have the interior of a beautiful violet colour, the outside being occasionally tinged with the same. They are fluviatile.

45. Galathea. — *Shell* equivalve, thick, and solid, somewhat triangular, nearly equilateral, and covered by a greenish horny epidermis, cardinal teeth two in one valve, and three in the other, lateral teeth at some distance, ligament exterior, projecting, and swollen. *Animal*, foot large and oblong. — 1 species recent.

Only one species is known of the *Galathea*, which inhabits the rivers of Africa, Ceylon, and India, and is very rare. Under the epidermis the shell is milk-white, stained with violet near the base, and marked with rays also of a violet colour.

46. Cyprina. — *Shell* equivalve, inequilateral, obliquely heart-shaped, covered with a

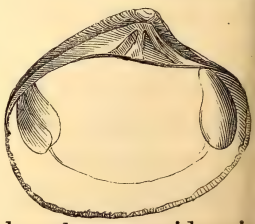
thick brown epidermis, ligament external, three cardinal teeth, and generally one lateral tooth



in each valve, bosses turned on one side. *Animal*, foot large. — 1 species recent, and 6 fossil.

Chiefly fossil, with one recent species, *Cyprina Islandica*, which is found in the Northern Seas. These shells are often very large.

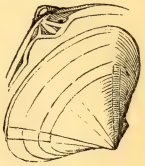
47. ASTARTE (Sowerby). — *Shell* equivalve, inequilateral, nearly orbicular, but somewhat transverse; two diverging teeth in the right valve, with one distinct, and one obsolete tooth in the left, covered with a brown epidermis



One of the muscular impressions is divided into two; ligament external. *Animal* like the other genera of this family. — 4 recent, and 12 fossil.

Some of the species are English, and are generally found on the sandy mud at very variable depths.

48. CYTHERIA. — *Shell* equivalve, inequilateral, triangular or transverse, ligament on the longest side, four cardinal teeth in one valve, and three in the other, lateral teeth none. *Animal*, foot large. — 78 species recent, and 9 fossil.

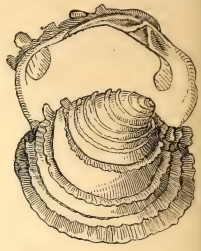


These shells resemble much the *Venus* in their beauty and colouring, but the number of teeth slightly distinguishes them. They inhabit the Indian and Atlantic Oceans, and one species, the *Cytheria lusoria*, is found in the Chinese seas; the latter is employed by the Japanese and Chinese in certain games, and is painted by them in the interior of various colours, and representing various figures.

This genus resembles so greatly the next that some authors class them together: the

fourth cardinal tooth, which is supposed to distinguish them, is sometimes scarcely visible.

49. VENUS. — *Shell* equivalve, inequilateral, nearly round or oval, sometimes rough on the outside, and every where closely shut. Three cardinal teeth in each valve, sometimes lateral teeth, bosses slightly turned on one side, ligament on the longest side. *Animal*, foot variable in form, but compressed. — 96 species recent, and 13 fossil.



This genus, which is one of the most beautiful amongst the Dimyaria, is found in all parts of the world. The species *Venus mercenaria* is cut by the North American Indians into beads, of which they construct their wampum or treaty belts, and the shells are also used among them as money, and are made into ornaments for their dresses. Most species serve as food for man. These Mollusca lie buried in the sand, at a short distance from the shore, and are most abundant in hot climates.

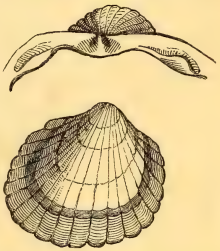
Lamarck's genus *Venericardia* is now sup-

pressed, and the species forming it united to the genus *Cardita* in the following family.

### Family 9. — *Cardiidæ.**

The *Cardiidæ*, or Cockle family, are the next in order; there are four genera. The cardinal teeth are irregular both in form and situation, and there are generally one or two lateral teeth. The shells are usually globular, and are almost all marked with raised ribs; they often present also the form of a heart, when they are seen on the side upon which the ligament is placed.

50. Cardium. — *Shell* heart-shaped, equivalve, nearly equilateral, having generally radiated ribs, and the borders of the valves toothed or plaited, two cardinal and two lateral teeth in each valve, ligament exterior, bosses prominent. *Animal*, foot large. — 48 species recent, and 30 fossil.

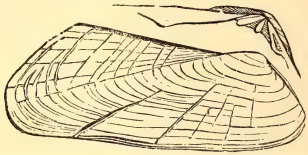


Some of the species are very beautiful, and

* *Les Cardiacées*, Lamarck.

others very singular in form; amongst the latter is the species *Cardium cardissa,* in which the valves are flattened, but in a contrary manner to the generality of flat Bivalves. This genus is found almost every where lying buried in the sand near the sea-shore; by means of their long elbow-shaped foot, the animals have the power of leaping to a considerable distance. *Cardium edule* is the common species, and is frequently used as an article of food.

51. CARDITA. — *Shell* equivalve, oblong, inequilateral, having in one valve two unequal

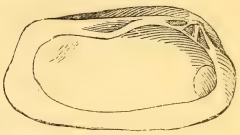


teeth, one short and straight under the bosses, the other oblique, and in the other one thick, oblique, elongated tooth. Valves more or less strongly ribbed or smooth, waved at the edge. *Animal,* foot large and thick. — 25 species recent, 7 fossil.

Some species are said to attach themselves

by a byssus to rocks. They are brought from Amboyna, New Holland, Africa, and the Northern Seas.

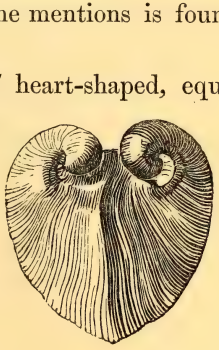
52. CYPRICARDIA. — *Shell* oblong, finely radiated from the summit to the base, equivalve, very inequilateral, bosses very near one end, having three cardinal and one lateral tooth in each valve. *Animal* unknown. — 4 species recent, 7 fossil.



Found principally in masses of coral in St. Domingo, and on the coasts of Guinea and New Holland. It also bores into soft stones.

The genus *Hiatella* of Lamarck is no longer used. The only species he mentions is found to be a *Saxicava.*

53. ISOCARDIA. — *Shell* heart-shaped, equivalve, inequilateral; bosses very prominent, rather spiral, recurved in the same direction, and not touching each other; cardinal teeth two, lateral, one in each valve;



ligament exterior. *Animal*, foot rather large. — 3 species recent, 1 of which is also fossil, and 5 fossil only.

The bosses of this shell are so peculiar that they easily indicate the genus. The *Isocardia* lives usually in the sand within reach of the waves, and is found in Europe, the East and West Indies, and New Holland; the *Isocardia cor* is frequently met with in Dublin Bay. At Torbay the animal is fried by the fishermen, and the dish called "red noses."

### Family 10. — *Arcidæ*.*

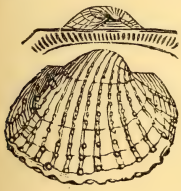
The next family is the *Arcidæ*, or Ark shells, which are distinguished from all the others by the great number of teeth; they have the appearance of those of a fine saw, and form a straight or curved continuous line, without any distinction of cardinal or lateral. There are five genera, the greater number of which bury themselves in sand near the coasts, all being at the same time marine, and some attaching themselves to the rocks by a byssus.

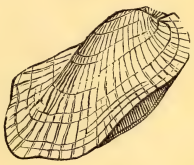
* *Les Arcacées*, Lamarck.

54. Cucullæa. — *Shell* equivalve, inequilateral; bosses not touching each other; muscular impression forming a partly detached shelly plate within; hinge straight, with a row of small teeth; ligament external. *Animal*, foot large.—1 species recent, 6 fossil.

This shell greatly resembles the Arca: there is but one species, which is found in the sand in the Indian Ocean: its colour is a deep cinnamon brown externally, and brown tinged with violet internally.

55. Arca. — *Shell* transverse, nearly equivalve, inequilateral, heart-shaped, valves ribbed,



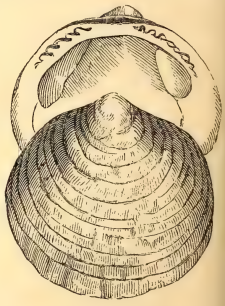


and in some species gaping at the lower part; hinge straight; bosses prominent and distant, and often a little recurved; ligament external.

*Animal,* foot short and thick. — 40 species recent, 18 fossil.

Some of the species bury themselves in the sand, and others moor themselves by a byssus to stones, coral, &c.; a few have one valve larger than the other, and many have a velvety or shelly epidermis, frequently ending in a deep fringe at the margin. They are found in the Atlantic, Pacific, and Indian Oceans, the Mediterranean, &c.

56. PECTUNCULUS. — *Shell* nearly round, equivalve, almost equilateral; hinge curved, with a line of teeth diverging on each side, those in the middle being sometimes incompletely formed; ligament external, hairy epidermis. *Animal,* foot large. — 20 species recent, 15 fossil.



The *Pectunculus* is found in the West Indies, Atlantic Ocean, and Mediterranean, where it lives on the sandy or muddy coasts, and moves with the aid of its foot. Many of the species have a soft downy epidermis. No byssus.

57. NUCULA. — *Shell* varying in shape, equivalve, inequilateral; teeth small, numerous, and prominent, with a large spoon-shaped one in the middle; hinge curved or straight; bosses contiguous and curved; ligament partly internal; epidermis green, or dark olive brown. *Animal,* foot large but thin. — 10 species recent, 7 fossil.

The localities of this genus are the Baltic and Mediterranean, the Indian Seas, the English Channel, &c., where they are met with on the sand and mud, either on the open coast or at the mouth of rivers. The shell is generally pearly inside.

58. TRIGONIA.—*Shell* pearly; cardinal teeth

oblong, transversely furrowed, two in the right valve and four in the other; equivalve, inequilateral, triangular, ribbed or furrowed, ligament external. *Animal*, foot sharp. — 1 species recent, 17 fossil.

There is only one species, which is found in the deep seas of New Holland. The interior is lined with highly iridescent mother of pearl.

Lamarck had originally placed this genus amongst the *Arcacées* (where Deshayes thinks it should be placed); he afterwards made it, with another genus *Castalia*, into a family; but it has since been ascertained that the *Castalia* belongs to the *Unionidæ*, and it is therefore here left as was originally intended.

### Family 11. — *Naiïdæ*.*

In this family there are four genera: they are all inhabitants of fresh water, and particularly of American rivers, of a dark brown colour outside, caused by an epidermis, and very pearly within, with teeth not very distinctly visible.

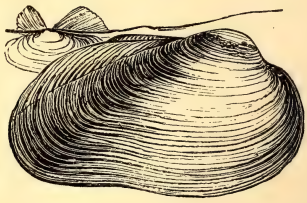
* *Les Nayades*, Lamarck.

The shells of this family (like all others which are lined with what is called mother-of-pearl) are sometimes found to contain pearls of a good quality, and in large numbers, as many as sixteen having been taken from one shell. The Esk and Conway are celebrated for them. Sir Richard Wynn, chamberlain to Catherine, queen of Charles II., is said to have presented her majesty with a Conway pearl, which is to this day honoured with a place in the regal crown. Some of the Scotch rivers have produced numerous specimens of large and beautiful pearls, which have borne a high price. A paper in the *Philosophical Transactions for* 1693 gives a curious account of the fishery for these pearls in the river Omagh, county Tyrone, Ireland. "The poor people," the writer says, "in the summer months go into the water, and some with their toes, some with wooden tongs, and some by putting a sharpened stick into the opening of the shell, take them up; and although, by a common estimate, not above one shell in a hundred may have a pearl, and of these pearls not above one in a hundred be tolerably clear, yet a vast number of fair mer-

chantable pearls are offered for sale by these people every summer assizes. Some gentlemen of the country make good advantage thereof, and myself heard that a miller took out a pearl which he sold for 4*l.* 10*s.* to a man that sold it for 10*l.*; the last purchaser sold it to the late Lady Glenlealy for 30*l.*, with whom I saw it in a necklace: she refused 80*l.* for it from the late Duchess of Ormond."

Between the years 1761 and 1764 the pearls found in the mussels of the river Tay were worth 10,000*l.* It is not uncommon now to find pearls which are sold for one or even two pounds.

59. UNIO.—*Shell* thick and solid, trans-

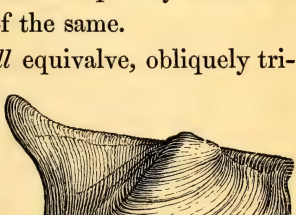


verse, equivalve, inequilateral; bosses prominent and eroded; cardinal teeth solid, short, and oblique; ligament external. *Animal*, foot

very large, thick, and of a square form.—83 species recent, and two fossil.

The *Unio* is found in the rivers of Europe, both the Indies, and elsewhere; it is called the *fresh-water mussel.* It buries itself in the sand, with the bosses undermost, and sometimes produces tolerably large pearls: the valves in some species are not quite closed, and they are often highly iridescent within, sometimes white, sometimes pink; the colour, however, though constant in some species, frequently varies in different individuals of the same.

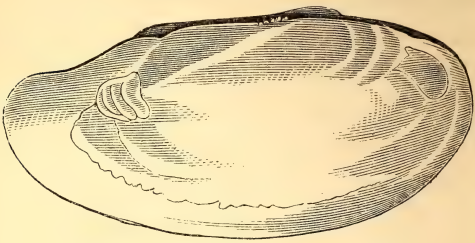
60. HYRIA.— *Shell* equivalve, obliquely triangular; hinge margin straight, both extremities elevated and winged; cardinal tooth long, and divided into many parts, lateral tooth long; ligament external. *Animal* resembling that of the Unio.—2 species recent.



Found in exotic lakes, covered with an olive-coloured epidermis, and pearly within.

61. ANODONTA.—*Shell* generally thin, equi-

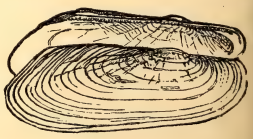
valve, inequilateral; hinge straight, with either no teeth or mere rudiments; shell transverse;



ligament external. *Animal* resembling that of the Unio. — 15 species recent.

They lie buried in the sand or mud of lakes and ponds, and are found distributed in every quarter of the world; the valves are thin and large, pearly, and covered with an epidermis. From their shape and lightness they are used in France for skimming milk.

62. IRIDINA.—*Shell* equivalve, inequilateral; hinge very long; teeth small, like little tubercles, and numerous; very iridescent; ligament external. *Animal*, foot compressed and sharp. — 1 species recent.



This genus, which only possesses one species, the *Iridina exotica*, is found in the rivers of warm climates, the Nile amongst others; the shell is rather thick, very brilliant inside, and of a red cast. Caillaud says that the natives of Egypt use it in preparing flax, and as spoons in measuring oil, butter, and different kinds of provisions.

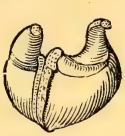
DIVISION IV.—CONCHIFERA AMBIGUA.*

This division contains but one family, *Chamidæ*.

FAMILY 12.—*Chamidæ*.†

The Chamidæ form the last family of the Dimyaria: the shells are large, rough, irregular, and attach themselves by one of their valves to rocks, corals, &c., or even to each other in a curious manner. There are three genera.

63. DICERAS.—*Shell* inequivalve; bosses very much lengthened, distorted, and turned different ways; one large tooth in the largest valve. *Animal* unknown.—2 species fossil.

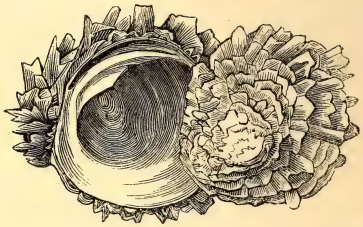


* *Les Conchifères ambigus*, Lamarck. *Ambigua*, from *ambiguus*, Lat., *doubtful*.

† *Les Camacées*, Lamarck.

These shells are only found in the fossil state, and are very irregular in form, and by most naturalists are now included in the next genus.

64. CHAMA. — *Shell* irregular, spiny, or rough, inequivalve; bosses recurved and un-

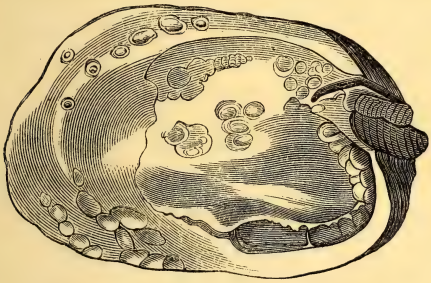


equal, turning either to the right or left; one thick and long tooth in one valve, and a deep pit in the other; ligament external. *Animal:* foot small. — 17 species recent, and 13 fossil.

These shells appear to present almost every variety of shape and colour; the former fact is perhaps owing to the accidents of their position. They are confined to warm climates, the Mediterranean being the lowest temperature. They are found usually at small depths in the sea, affixed by the largest valve to rocks, &c., and occasionally united together in large

masses. They are so firmly attached that it is difficult to avoid breaking the shell when they are removed from rocks.

65. ETHERIA. — *Shell* inequivalve, very irregular; teeth none; bosses short and indistinct;



ligament external, penetrating partly into the shell. *Animal*, foot large. — 5 species recent.

This genus is found in the rivers of Africa and Madagascar, and is abundant in the Nile above the Cataracts, where the inhabitants collect them for the purposes of ornamenting their tombs with the shells, and feeding upon the animal. They are pearly within, foliaceous on the outside, large, and fix themselves by the under valve often to one another, presenting the most curious distortions of form. The in-

terior of the valves is often of a vivid green colour, and raised in small blisters, which are said to be formed by the accidental introduction of small particles of sand during the formation of the nacrous fluid.

## Order III.

### MONOMYARIA.*

Nearly the whole of the genera arranged under this order and its families, attach themselves to rocks and other substances, not possessing the power of locomotion enjoyed by the *Dimyaria*, still less that degree with which the *Univalves* are endowed. They are more limited in number than the Bivalves possessing *two* muscular impressions, but there are among them several well known, and to us useful genera, as the *Oyster*, the *Mussel*, and the *Pearl Oyster*.

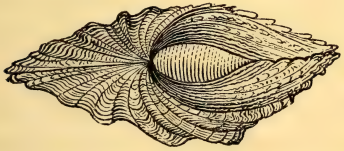
* Called sometimes *Unimusculosa*, the Latin form of expressing the sense of *Monomyaria*. *Les Conchifères monomyaires*, Lamarck.

DIVISION I. — *Ligament long and marginal.*
3 families, *Tridacnidæ, Mytilidæ, Malleidæ.*

FAMILY 1. — *Tridacnidæ.**

The *Tridacnidæ,* or *Clams,* are the giants of the acephalous Mollusca, nearly all the species attaining a large size; they are transverse and equivalve, and attach themselves by a fibrous muscle to rocks and corals. They are generally found in exposed situations.—Only two genera.

66. TRIDACNA. — *Shell* regular, equivalve,



inequilateral, transverse; two compressed blunt teeth in each valve; a wide opening on one side of the bosses for the passage of the byssus; ligament external. *Animal,* foot cylindrical and thick. — 7 species recent.

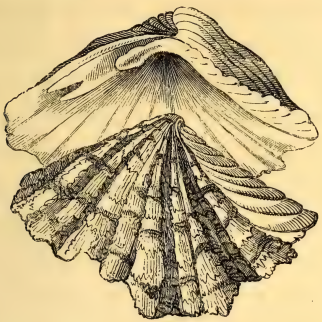
These shells are brought from the Indian Ocean, where they attain so large a size that a single person can with difficulty carry one

* *Les Tridacnées,* Lamarck.

valve, and some, indeed, have been said to weigh 500 lbs. In Roman Catholic countries, the shells are sometimes used as receptacles for the holy water in the churches, and formerly they were considered sufficiently valuable to form a present to a monarch, those in the church of St. Sulpice at Paris having been presented to Francis the First by the republic of Venice. The animal is correspondingly large, and it has been stated that more than one hundred persons can make a meal upon that which inhabits the *Tridacna gigas:* this may be an exaggeration, but there is no doubt the architect of so extensive a dwelling must be exceedingly large.* The *Tridacna* adheres to the rocks by a stout and strong byssus with so much tenacity as to require the aid of a hatchet to separate them. A specimen of this shell, brought from Sumatra, is now in Arno's Vale, Ireland, and weighs 507 lbs., each valve being four feet six inches in length, and two feet five and a half inches in breadth. The interior of the shell is of an opaque white, and very beautiful.

* The valves are so large as probably to require centuries to complete their growth. Reeve's Conchologia Systematica.

67. HIPPOPUS. — *Shell* equivalve, regular, inequilateral; valves closed, transverse, two



compressed teeth in each valve; ligament external; shell imbricated with numerous tubercles. *Animal* similar to that of the Tridacna. — 1 species recent.

The *Hippopus* has no opening in the valves, and is therefore presumed to be destitute of a byssus. It is not nearly so large as the *Tridacna*, and is a common shell in collections, although there is only one species, the *Hippopus maculatus*, from the Indian Ocean.

### FAMILY 2. — *Mytilidæ.**

The *Mytilidæ*, or *Mussel* family, possesses

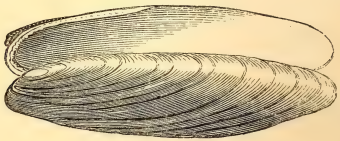
* *Les Mytilacées*, Lamarck.

four genera; they have all more or less the shape of the common genus, and some are pearly in the inside. Their habits vary, some attaching themselves by a byssus to the rocks, whilst others perforate them; in all the ligament is external, and they have rarely any teeth.

68. MODIOLA.—*Shell* rather transverse, equivalve, inequilateral; bosses prominent and slightly removed from the end; valves gaping a little; no teeth; ligament almost internal. *Animal*, foot tongue-shaped.—27 species recent, and 20 fossil.

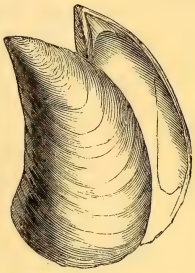
Attached by a byssus to the rocks, of which they sometimes almost cover the surface. Sometimes found in holes of stones, madrepores, &c. They are met with in the Indian Seas, New Holland, the Atlantic, &c.

69. LITHODOMUS (Cuvier). — *Shell* trans-



verse, cylindrically oblong, equivalve, and covered with a brown epidermis; extremities round; bosses scarcely prominent. The hinge is straight; ligament mostly internal. *Animal*, foot tongue-shaped.

The *Lithodomus*, when young, suspends itself to rocks by a byssus*, but, as it grows, it pierces a hole, and introduces itself, forming a cavity which thenceforward it never leaves: indeed, after a short time, as it merely enlarges the interior, without making the entrance any wider, its increasing bulk renders it unable to quit its cell, and in these circumstances its byssus dies away, being no longer necessary. It is common in the Mediterranean and the Antilles, where it often pierces other shells.



70. MYTILUS. *Shell* longitudinal, equivalve, ham-shaped, somewhat triangular, bosses placed at the extreme end, hinge mostly without teeth; fastened by a byssus;

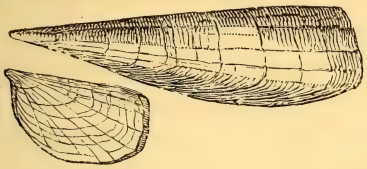
* This assertion is from Cuvier; Sowerby thinks it has no byssus.

ligament partly internal. *Animal*, foot thin and cylindrical.—38 species recent, and 9 fossil.

The *Mytilus* or *Mussel* is found in most parts of the world, and is abundant on rocky coasts, where it is met with, attached by its byssus so as to be covered at high tide: an instance is known of a lobster having been found covered with them. When the shell of the common English species, the *Mytilus edulis*, is freed from its epidermis and polished, it is of a beautiful deep purple colour; the animal is much sought after as an article of food, and, although not equal to the oyster, makes a palatable dish; but care is necessary, as it is often unwholesome. Frequently towards the end of autumn, small crabs are found in the shell of the *Mytilus*, which live there sheltered from danger without hurting the inhabitant. Small seed pearls are sometimes found in this species. One or two species are found in fresh water, the Danube, the Wolga, and Rhine, the London Docks, &c. &c. A new generic name, *Drissena*, has been given to them by M. Vanbeneden, but it has not been universally adopted.

71. PINNA. *Shell* equivalve, rather trian-

gular, ham-shaped; bosses terminal, the other extremity gaping; no teeth; a long and some-



what internal ligament; shell thin and fragile. *Animal*, foot thin, worm-shaped. — 16 species recent, and 4 fossil.

The *Pinna* is usually found moored to the sand by its byssus; it is common to nearly all seas, and grows to a considerable size, some specimens being a foot and a half long; one species is found in our own seas on the coasts of Dorsetshire and Sussex. Pearls are occasionally found in the shell of the *Pinna*, but they are of an amber colour and of little value; sometimes a small species of crab takes up its abode inside, without prejudice to either party. A species found in the Mediterranean is much sought after by the inhabitants of Sicily and Calabria, not only as an article of food, but also for the sake of its byssus, which is

long, fine, shining, and abundant: of this they fabricate a species of cloth, very remarkable for its warmth and softness, but which will not take any dye. In the British Museum there is a pair of gloves made of this material, in a case with some large specimens of the shell; and it is recorded in history, that Pope Benedict XV. had a pair of stockings presented to him in 1754 made of this material; they were enclosed in a very small box, and were extremely fine in texture.

### Family 3. — *Malleidæ.**

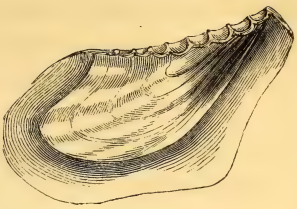
The shells of this family are foliaceous†, and have the interior highly iridescent and pearly; indeed they comprise amongst their number the pearl oyster: there are five genera, and nearly all adhere by a byssus.

72. Crenatula. — *Shell* nearly equivalve, irregular, foliated, flattened; hinge straight, marked with a few semicircular excavations;

* *Les Malléacées*, Lamarck.

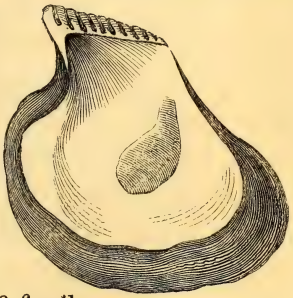
† Composed of thin plates of shell, laid one upon the other, each successive lamina projecting beyond its predecessor.

ligament internal; no distinct opening for the byssus. *Animal* unknown. — 7 species, recent.



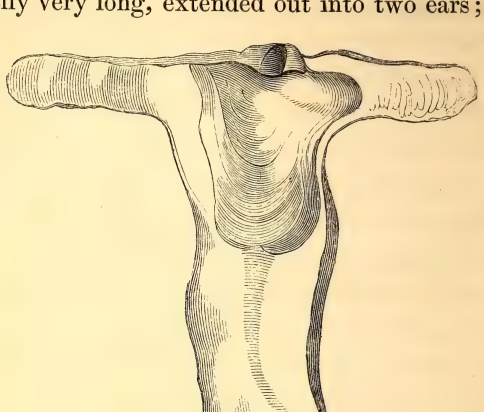
This shell, which is thin and fragile, lodges in sponges, &c. It is brought from India and Australia. The byssus has not been seen, and therefore it is not positively ascertained whether it possesses one.

73. PERNA. — *Shell* nearly equivalve and flat, irregular, gaping for the passage of the byssus; bosses small; margins very brittle; hinge straight and broad, divided into parallel grooves. *Animal*, foot very small. — 10 species recent, 6 fossil.



From India, the Cape de Verde Islands, &c., generally found moored to rocks deep in the sea, and occasionally to mangrove trees. Considerable clusters are frequently found attached firmly to each other by the byssus.

74. MALLEUS. — *Shell* irregular, variously distorted, nearly equivalve; hinge margin generally very long, extended out into two ears; no

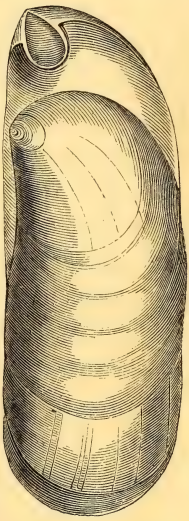


teeth, but a conical pit under the boss, which is small; an oblique notch for the passage of the byssus, near the boss; ligament external. *Animal*, foot very distinct. — 6 species recent.

The *Malleus* is a native of the East and West Indies and Australia: it attaches itself by a byssus to submarine rocks. The shape is so very various, that scarcely two of a species

can be found alike, and the rarity of some causes them to be very valuable, and much sought after. Externally the appearance is very rude and irregular, but, on the other hand, the interior is exceedingly beautiful, being lined with the most brilliant mother-of-pearl.

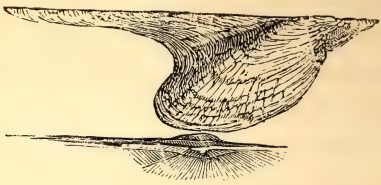
75. VULSELLA.—*Shell* longitudinal, tongue-shaped, nearly equivalve, irregular; bosses equal; hinge, with a prominent callosity in each valve, showing an impression of a conical and arched pit for the ligament, which is partly external. *Animal* unknown, without byssus.—6 recent and 1 fossil species.



These shells are not attached, but are found buried in sponge. They are iridescent within, and are brought from the Indian Ocean and the seas of New Holland.

This genus was placed by Lamarck in the *Ostreidæ* family, but more modern naturalists place it here.

76. AVICULA. — *Shell* inequivalve, fragile; hinge margin straight and lengthened; une-

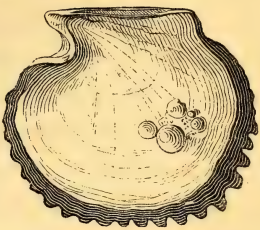


qually eared; minute teeth; a large byssus. *Animal*, foot conical, worm-shaped, and rather long. — 21 species recent, and 8 fossil.

There are several beautiful species of the *Avicula* from the Indian Ocean, coast of Brazil, New Holland, the Red Sea, &c., and one from the Mediterranean. The valves are much in the shape of wings. The interior part is pearly in the centre: some species have a broad black border surrounding it, and the margin terminated in a fringe, occasioned either by the epidermis or the foliaceous texture of the exterior. The hinge of the *A. Macroptera* is used for making ornaments (bijoux) called peacock's eyes.

The *Avicula* and *Meleagrina* of Lamarck are now classed together, as the animals resemble each other.

The *Avicula Margaritifera*, or Pearl Oyster, is found chiefly in the Persian Gulf, and at Ceylon; it is lined with a pearly substance, which is formed by the animal in thin layers, and is imported into Europe in large quantities, for the purpose of making knife handles, buttons, &c., under the name of *mother-of-pearl.*



If by any accident the inner surface of the shell is injured, so as to cause a fracture in the mother-of-pearl, the layers in that place become for the future irregular, and a lump is gradually formed, which from accidental circumstances is sometimes oval, sometimes globular, and sometimes pear-shaped. Pearls, as these lumps are called, are occasionally found loose in the shell, and in this case the pearly substance has been deposited upon a loose grain of sand, or diseased ovum or egg of the animal.

" Pearls are small nacrous balls, that become formed and hardened within the body of the

animal; they are found deposited in the most fleshy parts, particularly within and around the adductor muscle, and are said to be occasioned by the overcharge of those glands whose function it is to secrete the nacrous fluid destined for the internal lining of the shell. When the animal is thus diseased, this beautiful iridescent fluid is very irregularly discharged, being also deposited upon the inner surface of the shell in little excrescences; these are often detached, and form articles of commerce as pearls of inferior value, the former being considered more precious, both on account of their rotundity of form and the clearness and beauty of their complexion."*

Excellent imitations of pearls have been made with hollow glass globules, the inside of which is covered with a liquid called pearl essence, and then filled with white wax: the essence is composed of the silver-coloured particles which adhere to the scales of the Bleak fish, and was first applied to this purpose, by a Frenchman named Jacquin, early in the

* Reeve's Con. Sys.

last century. The accounts of the pearl fishery are exceedingly interesting.

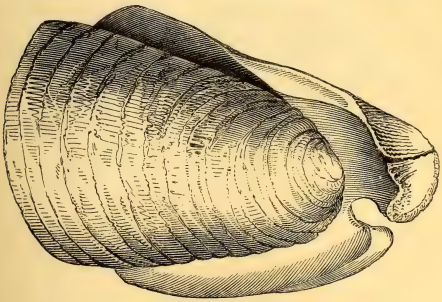
DIVISION II. — *Ligament not marginal, contracted into a short space under the bosses. Always visible. The shells are all inequivalve.*

Two families, *Pectenidæ, Ostreidæ.*

### FAMILY 4. — *Pectenidæ.* *

The genera of this family are all more or less fan-shaped, and marked with rays from the bosses to the circumference; the substance of the shell is solid, not foliaceous. Some are attached, others free. — There are five genera.

77. PEDUM. — *Shell* irregular, longitudinal,

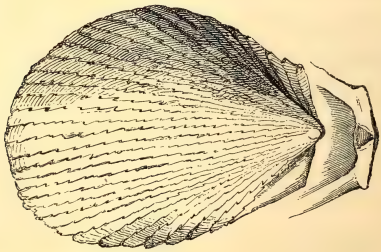


* *Les Pectinides,* Lamarck.

or hatchet-shaped, inequivalve, and slightly eared. A groove or pit in each valve, which increases in size with age, and bears the ligament; bosses unequal and distant, the lower valve rather convex, with the sides reflected over, upper valve flattish. A large yellow byssus. — *Animal*, foot small. — 1 recent species.

The only species known is found in the Indian Seas, at great depths, and is rare. It is white, slightly tinged with purple near the bosses; and buries itself partially in madrepores, in crevices of its own boring.

78. LIMA. — *Shell* longitudinal, nearly equivalve, obliquely fan-shaped, slightly eared;



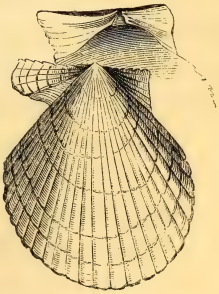
valves gaping near the bosses, which are distant; hinge without teeth; no byssus. A tri-

angular pit for the ligament. — *Animal*, foot cylindrical. — 6 species recent, and 18 fossil.

The *Lima* is almost always white; some of the species are rare. It is found on the coasts of America and the Isle of France. It has a brown horny epidermis.

The genus *Plagiostoma* of Lamarck, which he placed after *Lima*, and which contained six species, is by Deshayes divided between *Lima* and *Spondylus*. He thinks the genus unnecessary.

79. PECTEN. — *Shell* regular, nearly round, eared, ribbed or furrowed, inequivalve; ligament internal and triangular; hinge margin straight; no teeth; bosses contiguous. — *Animal*, foot small, dilated at the extremity. — 61 species recent*, and 58 entirely fossil.



The animal of the *Pecten* has the power of making frequent and sudden contractions of its

* Several of the recent species are also found fossil.

muscles, by which means it moves rapidly through the water; and it requires some agility to catch the shell, as it flutters amongst the corals where it dwells. Aristotle mentions their power of leaping; and this observation has since been confirmed. A basket full of the common Pecten placed at the edge of the water has been speedily emptied, by the individuals springing from their confinement to their native element. Some of the species are stout and heavy, others thin and transparent, and many are ornamented with beautiful colours.

The *Pecten* is found almost every where; on our south coasts it is abundant, and much used as an article of food. In some countries the shells of the *Pecten maximus* are used as plates by the poor; in Paris the restaurateurs employ them for the same purpose, when serving up a certain preparation of mushrooms; and in England they are employed in cooking scalloped oysters, and the shell is consequently known as the *scallop shell.* The *Pecten Jacobæus* was formerly the badge of the pilgrims who had been to the Holy Land, and was worn on their caps and cloaks.

80. PLICATULA. *Shell* irregularly ovate, inequivalve, one valve being more convex than the other, sides strongly and transversely grooved; ligament internal, between the teeth; bosses unequal. *Animal* unknown. — 5 species recent, and 10 fossil.

Attached by the under valve to stones, &c.

81. SPONDYLUS. — *Shell* eared, inequivalve, rough, with spines and plaits; two strong teeth, uniting the valves closely; bosses unequal, that of the lower valve projecting; ligament internal. *Animal*, foot very indistinct. — 21 species recent, and 9 fossil.

The *Spondylus* lives at great depths in the sea, and attaches itself to corals, &c.: it has often been found fixed to anchors, cannons, and other iron articles that have been for some time at the bottom of the sea. Many of the species are very beautiful, and of very vivid colours, such as bright red, pink and yellow, or orange. A fine collection of these beautiful shells forms

at once a union of elegance and beauty hardly to be surpassed amongst the bivalves. They are found in the Indian Ocean, the Mediterranean, and on the American coasts.

The fossil genus *Podopsis* of Lamarck, is joined by Deshayes to *Spondylus*, and also some species of *Plagiostoma*.

### Family 5. — *Ostreidæ*.*

This family comprehends the oyster tribe, and the genera forming it are usually affixed by one valve to stones or rocks; some of the shells are foliaceous.— There are four genera.

82. — Ostrea. — *Shell* inequivalve, irregular, flattened; substance foliaceous; bosses distant, and very unequal, that of the lower valve becoming very large with age, upper valve smallest; no teeth. — *Animal*, no foot.—53 species recent, and 82 fossil.

Oysters have been found in most parts of the world in abundance, although none have as yet been discovered in the polar regions: they

* *Les Ostracées*, Lamarck.

are inhabitants of salt water only, and are always found on rocky ground, at no great

depth from the shore, attached by the under valve. The oyster, and indeed all bivalves which adhere by the shell, are covered at their birth with a mucilaginous liquid which attaches them to the surface of any object on which they rest. The animal strengthens this first adhesion in the same manner that it increases the size of its shell. At the mouths of several American, African, and Indian rivers, great quantities of oysters are found attached to the roots of trees, and even to their branches, where they are so situated as to be covered by the tide. Mrs. Lee, in her "Stories of Strange Lands" says, "The flavour of the tree-oyster is

delicious; they are small, and cover the lower branches of the mangroves. Two or three of these branches form an ample luncheon, and in the river Gaboon we had a daily supply." In the British Museum, there is a large specimen of a crab, to the back and claws of which a number of good-sized oysters have attached themselves.

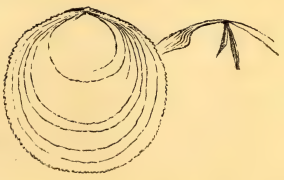
Oysters generally spawn in May, and their growth is tolerably rapid; three days after the deposition of the spawn, the shell of the young oyster may be seen nearly a quarter of an inch broad; in three months it is larger than a shilling, and in six months it exceeds a half-crown piece in size. Oysters have been used as food almost from time immemorial; the Greeks, but more especially the Romans, held them in great estimation, those from the Dardanelles, Venice, and England being considered the best. The English fishery is principally carried on at Wivenhoe, near Colchester, Feversham and Milton in Kent, in the Medway, and at Tenby in Wales. When the oyster is first taken out of the sea, it has frequently a strong muddy taste, and it is therefore placed in what is called

a preserve, which is a kind of tank dug in the sand near the sea, and communicating with it by a narrow passage; this place is frequently cleared of mud and dirt by letting the water run off and refilling it; by this means the quality of the oyster is much improved. They are not considered wholesome during May, June, July, and August, and are not eaten until they are one year and a half old.

The animal of the oyster appears to be one of the most inanimate of the Mollusca; it remains fixed upon a rock, or other submarine object, enjoying only the nourishment brought it by the waves, and giving scarcely a sign of life, except the opening and shutting of its valves.

The genus *Gryphæa* of Lamarck is by Deshayes and other conchologists incorporated with the genus *Ostrea*.

83. PLACUNA.— *Shell* nearly equivalve, irregular, very much compressed, iridescent; two internal cardinal teeth in one valve, shaped like a V., and in the other



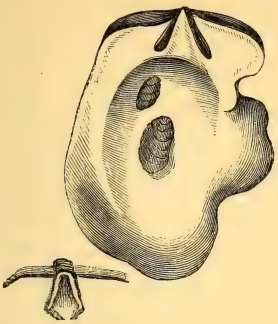
valve impressions to receive them; shell thin, and nearly transparent. *Animal* very little known.—3 species recent, 1 fossil.

Found on sand in India, China, the Red Sea, &c. The *Placuna Placentia*, commonly known as the Chinese window oyster, is sufficiently transparent to be used for windows, lanterns, &c., as horn is used in this country.* Though the animal has not been much examined by naturalists, it is obvious that it must be exceedingly flat; indeed, not much thicker than a shilling; for the valves, when closed, appear nearly to touch. The shells are sometimes waved, and bent in a curious manner.

84. PLACUNANOMIA (Broderip).—*Shell* irregular, nearly equivalve, smooth, plaited round the edge, and somewhat glossy inside. The hinge consists of two narrow ribs, unequal in length, and converging at the base, in one valve,

* Mr. Gray mentions that the Chinese use the powder of this shell as silver in their water-colour drawings. He has himself used it in colouring the figures of fish with good effect. It is not quite so brilliant as the powdered leaf metal, but it has the advantage of not changing colour by exposure.

and in the other two corresponding grooves. The lower valve has a longitudinal hole near



the hinge, and the opening is entirely filled up by the ossification of the tendon passing through it. Besides the muscular impression in the upper valve, there is a mark which shows the attachment of the other extremity of the tendon of adhesion.

Mr. Cuming found one species of this singular shell attached to dead bivalve shells and coral, at the depth of eleven fathoms in the Gulf of Dulce, in Costa Rica, Central America. It is intermediate, as its name denotes, between *Placuna* and *Anomia:* the hinge is like the former, and the opening in the lower valve for

the passage of the tendon causes its resemblance to the latter.

85. Anomia. — *Shell* inequivalve, irregular, attached to rocks, &c. by a calcareous mass affixed to a muscle, which passes through a hole in the lower valve, the latter being small and nearly flat. *Animal*, foot rudimental. — 9 species recent, and 1 fossil.

From the Mediterranean and other European seas. It is found adhering to oysters and other substances, rocks, &c., and takes the irregular form of the surface to which it is attached; so that if fixed to a *Pecten*, it will be striated, &c. It cannot be detached without destroying the animal. The calcareous mass by which this shell is attached is so constructed as to close the hole in the valve when the muscle is contracted. The animal is phosphorescent. It is eaten in France.

[*To face page* 133.]

# MOLLUSCA. — UNIVALVES.

## DIVIDED INTO FIVE ORDERS.

*Animal.* Soft, furnished with a head, most frequently with eyes and tentacula, or possessing arms disposed in the form of a coronet. Body sometimes naked, sometimes enclosing a shell, but generally having an external shell.

*Shell.* Composed of one piece only.

### 1. PTEROPODA.

*Animal.* Having no feet, but two opposite fins, adapted to swimming.
*Shell.* Thin; cartilaginous, or horny.

*Hyalæa, Clio* (no shell), *Cleodora, Limacina, Cymbulia, Pneumodermon* (no shell).

### 2. GASTEROPODA.

*Animal.* Foot united to nearly the whole length of the body, and used for crawling. Body straight, never spiral.
*Shell.* Either cup-shaped, or slightly rolled up; in some genera not covering the body.

EIGHT FAMILIES.

1. TRITONIDÆ. (No shell.) *Glaucus, Eolis, Tritonia, Scyllæa, Tethys, Doris.*
2. DENTALIDÆ. (*Shell* tubular, open at both ends.) *Dentalium.*
3. PHYLLIDIDÆ. (*Shell* either of one cup-shaped piece, or with moveable pieces at the back.) *Phyllidea* (no shell), *Chitonellus, Chiton, Patella, Siphonaria.*
4. SEMIPHYLLIDIDÆ. (*Shell* cup-shaped, but very flat.) *Pleurobranchus, Umbrella.*
5. CALYPTRÆIDÆ. (*Shell* cup-shaped, though irregularly so; some genera with internal pieces.) *Parmophorus, Emarginula, Fissurella, Crepidula, Calyptræa, Hyponix, Pileopsis.*
6. BULLÆIDÆ. (*Shell* slightly rolled up.) *Acera* (no shell), *Bullæa, Bulla.*
7. APLYSIDÆ. (*Shell* nearly flat and thin.) *Aplysia, Dolabella.*
8. LIMACIDÆ. (*Shell* very slightly rolled or cup-shaped.) *Onchidium* (no shell), *Limax, Parmacella, Testacella, Vitrina.*

### 3. TRACHELIPODA.

*Animal.* Foot attached to the neck, and used for crawling. Part of the body spiral, and always enveloped in a shell.
*Shell.* Spiral, and the mouth either entire at the base, notched, or channelled.

#### PHYTOPHAGA.

*Animal.* Feeding on vegetable substances, and being either marine, fluviatile, or terrestrial.
*Shell.* Aperture entire.

TEN FAMILIES.

1. COLIMACIDÆ. (*Shell* spiral, no projecting parts. The right lip often recurved outwards, globular or turreted, and generally thin. Terrestrial.) *Helix, Carocolla, Anastoma, Helicina, Pupa, Clausilia, Bulimus, Achatina, Succinea, Auricula, Cyclostoma.*
2. LYMNÆIDÆ. (*Shell* spiral, thin, smooth; right lip always sharp, never reflected. Fluviatile.) *Planorbis, Physa, Lymnea, Ancylus.*
3. MELANIDÆ. (*Shell* turreted, lips disunited; right lip sharp. Fluviatile.) *Melania, Melanopsis.*
4. PERISTOMIDÆ. (*Shell* conoid, or rather discoid, lips united; shell rather thin. Fluviatile.) *Valvata, Paludina, Ampullaria, Ampullacera.*
5. NERITIDÆ. (*Shell* semi-globular, or rather flat; left lip resembling a partition, like the deck of a boat. Fluviatile and marine.) *Navicella, Neritina, Nerita, Natica.*
6. JANTHINIDÆ. (*Shell* thin, of a violet colour; mouth triangular. Marine.) *Janthina.*
7. MACROSTOMIDÆ. (*Shell* ear-shaped, flat; mouth very large; lips disunited. Marine.) *Sigaretus, Stomatella, Stomatia, Haliotis.*
8. PLICACIDÆ. *Shell* with the left lip plaited, right sharp. Marine.) *Tornatella, Melampus, Pyramidella.*
9. SCALARIDÆ. (*Shell* with whorls sometimes not touching, lips circularly united. Marine.) *Vermetus, Magilus, Leptoconchus, Scalaria, Rissoa, Delphinula.*
10. TURBINIDÆ. (*Shell* turreted, conical, or pyramidal, substance thicker than the Colimacidæ; mouth round or oblong; lips not united. Marine.) *Solarium, Rotella, Trochus, Monodonta, Turbo, Planaxis, Phasianella, Turritella.*

#### ZOOPHAGA.

*Animal.* Feeding on animal substances only, and being marine.
*Shell.* Aperture notched or channelled.

FIVE FAMILIES.

11. CANALIFERIDÆ. (1st Division. *Shell* with a canal, more or less long, at the base of the mouth; right lip not thickened. Marine.) *Cerithium, Pleurotoma, Turbinella, Cancellaria, Fasciolaria, Fusus, Pyrula.* (2d Division. Right lip thickened.) *Struthiolaria, Ranella, Murex, Triton.*
12. PTERIDÆ. (*Shell* having the right lip dilated in the adult, either in one piece, or divided into fingers; a sinus at the lower part of the mouth. Marine.) *Rostellaria, Pteroceras, Strombus.*
13. PURPURIDÆ. (*Shell* with a short canal ascending and directed towards the back, or a notch; generally globular; left lip often spotted or rough. Marine.) *Cassidaria, Oniscia, Cassis, Ricinula, Purpura, Monoceras, Concholepas, Harpa, Dolium, Buccinum, Nassa, Eburna, Terebra.*
14. COLUMELLIDÆ. (*Shell* notched only. Left lip plaited distinctly. Marine.) *Columbella, Mitra, Voluta, Melo, Cymba, Marginella, Volvaria.*
15. CONVOLUTIDÆ. (*Shell* notched, whorls large, compressed, the last nearly or quite covering the whole of the rest. Marine.) *Cypræa, Erato, Ovula, Terebellum, Ancillaria, Oliva, Conus.*

### 4. CEPHALOPODA.

*Animal.* Feet or arms attached to the head.
*Shell.* Either polythalamous or monothalamous; many genera very flat; spire in or near the centre.

THREE DIVISIONS.

1st. POLYTHALAMA.

(*Shell* divided into chambers.) *Belemnites, Orthoceras, Spirula, Nummulites, Nautilus, Ammonites, Turrilites, Baculites.*

2d. MONOTHALAMA.

(*Shell* not divided into chambers.) *Argonauta.*

3d. No shell.

*Octopus, Loligopsis, Loligo, Sepia.*

### 5. HETEROPODA.

*Animal.* Feet or fins attached in various parts.
*Shell* slightly spiral, and nearly transparent.

*Carinaria, Atlanta, Pterotrachea, Phyllirõe.*

*Animal.* Soft, furnished with a head, most frequently with eyes and tentacula, or possessing arms disposed in the form of a coronet. Body sometimes naked, sometimes enclosing a shell, but generally having an external shell.

| 1. PTEROPODA. | 2. GASTEROPODA. | |
|---|---|---|
| *Animal.* Having no feet, but two opposite fins, adapted to swimming. *Shell.* Thin; cartilaginous, or horny. | *Animal.* Foot united to nearly the whole length of the body, and used for crawling. Body straight, never spiral. *Shell.* Either cup-shaped, or slightly rolled up; in some genera not covering the body. | *Animal.* F always en *Shell.* Spir<br>*Animal.* Fee either marin *Shell.* Apertu |
| *Hyalæa, Clio* (no shell), *Cleodora, Limacina, Cymbulia, Pneumodermon* (no shell). | EIGHT FAMILIES.<br>1. TRITONIDÆ. (No shell.) *Glaucus, Eolis, Tritonia, Scyllæa, Tethys, Doris.*<br>2. DENTALIDÆ. (*Shell* tubular, open at both ends.) *Dentalium.*<br>3. PHYLLIDIDÆ. (*Shell* either of one cup-shaped piece, or with moveable pieces at the back.) *Phyllidea* (no shell), *Chitonellus, Chiton, Patella, Siphonaria.*<br>4. SEMIPHYLLIDIDÆ. (*Shell* cup-shaped, but very flat.) *Pleurobranchus, Umbrella.*<br>5. CALYPTRÆIDÆ. (*Shell* cup-shaped, though irregularly so; some genera with internal pieces.) *Parmophorus, Emarginula, Fissurella, Crepidula, Calyptræa, Hyponix, Pileopsis.*<br>6. BULLÆIDÆ. (*Shell* slightly rolled up.) *Acera* (no shell), *Bullæa, Bulla.*<br>7. APLYSIDÆ. (*Shell* nearly flat and thin.) *Aplysia, Dolabella.*<br>8. LIMACIDÆ. (*Shell* very slightly rolled or cup-shaped.) *Onchidium* (no shell), *Limax, Parmacella, Testacella, Vitrina.* | 1. COLIMACIDÆ The right or turrete *Helix, Cl Clausilia, Cyclostom*<br>2. LYMNÆIDÆ always sha *orbis, Phy*<br>3. MELANIDÆ. lip sharp.<br>4. PERISTOMID lips united *vata, Palu*<br>5. NERITIDÆ. left lip re boat. Flu *tina, Neri*<br>6. JANTHINIDÆ mouth tri<br>7. MACROSTOM very large *Stomatella*<br>8. PLICACIDÆ. sharp. M *midella.*<br>9. SCALARIDÆ touching, *metus, Ma Delphinul*<br>10. TURBINIDÆ midal, sut mouth rou *Solarium, Planaxis,* |

*only.*

*PODA.*

*Feet or hed in arts.*

*y spiral, trans-*

*Atlan- achea,*

# PART IV.

## MOLLUSCA OR UNIVALVES.*

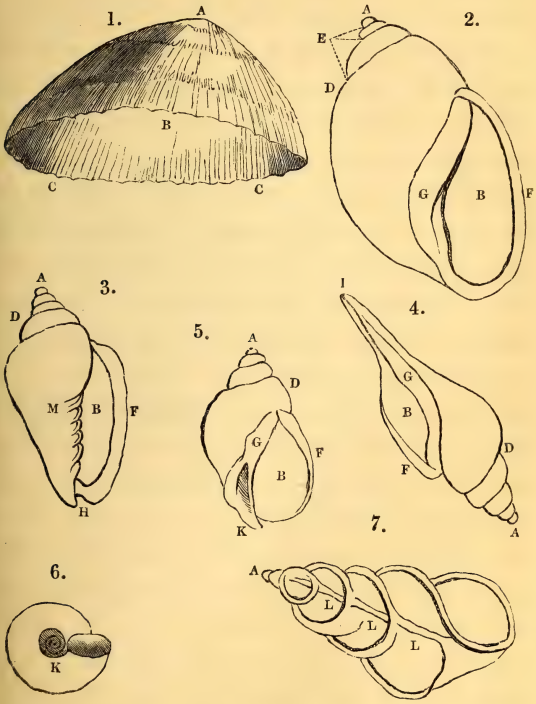
THE molluscs of univalve shells are all furnished with a head, and a foot or fins, and are divided into five orders, which are distinguished from each other by the construction of the foot: they are,—1. *Pteropoda* †, having fin-like feet used for swimming. 2. *Gasteropoda* ‡, having the foot proceeding from or covering the stomach. 3. *Trachelipoda* §, having it attached to that part which lies between the head and body, or neck. 4. *Cephalopoda* ‖, having them (for there are more than one) fixed to the head. And 5. *Heteropoda* ¶, with feet or fins varying in different genera.

In the annexed plan are shown, at one view, the divisions and subdivisions of the order Mollusca or Univalves; but before entering upon

* *Les Mollusques*, Lamarck.
† From *pteron*, Gr., *a wing*, and *poda*, *feet*.
‡ From *gaster*, *the stomach*, and *poda*.
§ From *trachelo*, *the neck*, and *poda*.
‖ From *cephale*, *the head*, and *poda*.
¶ From *heteros*, *various*, and *poda*.

them, it will be advisable to give representations of a few different kinds of univalve shells, with a description of the parts constituting them, and the names by which they are known, as in giving an account of the variations which exist in the different genera many of these will be referred to. In fig. 1. is delineated the simplest form, that of a *Patella*, in which the parts necessary for reference are but few. A is the *apex*, B the *mouth* or *aperture*, of which CC is the *margin*. The *exterior* and *interior* are sufficiently obvious. In figures 2. to 7., which are turbinated or spiral shells, and of a more complicated form, a greater number of terms have been adopted to mark the variations which occur. A is the *apex*, B the *mouth* or *aperture*, which in fig. 2. is *entire;* in fig. 3. *notched;* in fig. 4. *channelled*. D is the *spire*, formed of a greater or less number of *whorls*, the intersections of which, or where they wrap over, are called *sutures* E. F is the *right* or *outer lip;* G, the *left*, *inner*, or *columella lip;* H, in fig. 3., is the *notch;* I, in fig. 4., is the *channel* or *canal;* K, in figs. 5. and 6., the *umbilicus;* L, in fig. 7., is the *columella*, or *pillar*, which can only be

seen when the shell is cut open; M are the *plaits* on the left lip of fig. 3.



## Order I.

### PTEROPODA.*

The animals of this order have no feet to crawl with, but are free and floating, and have two opposite and similarly constructed fins adapted for swimming. Some genera only are furnished with a thin, cartilaginous, or horny shell. The greater part are animals of a small size. There are six genera, as follows:

1. Hyalæa. — *Shell* horny, transparent, ovate, globular; tridentated posteriorly, open at the summit and at the two posterior sides. *Animal*, body covered by a shell; head very indistinct; no eyes. — 17 species recent, 1 fossil.

These shells are brought from the Mediterranean and Atlantic. Their trivial name in England is Venus' Chariot.

2. Clio.—No shell. *Animal*, body oblong; head provided with several tentacula; two eyes

* *Les Ptéropodes*, Lamarck.

on the upper part of the head. — 7 species recent.

These mollusca inhabit the sea, where they are seen in calm weather and during the hottest part of the day. They appear and disappear continually on the surface. Found in the seas of the Cape of Good Hope, India, and the Northern Atlantic.

3. CLEODORA. — *Shell* gelatinous, cartilaginous, transparent, in the shape of a reversed pyramid, truncated, and open at the summit. *Animal*, body oblong; head distinct, having two eyes; no tentacula. — 11 recent and 2 fossil species.

The Indian and Atlantic Oceans produce these curious animals.

4. LIMACINA. — *Shell* thin, fragile, papyraceous, and spiral; the whorls discoid or flattened. *Animal*, body long, and greatly resembling the Clio. — 1 species recent.

The animal can retire completely into its shell. It inhabits the Northern seas; and is said to be devoured by whales in vast quantities.

According to Mr. Scoresby, it is found in great profusion near Spitzbergen.

5. Cymbulia. — *Shell* gelatinous, cartilaginous, very transparent, crystalline, oblong, in the shape of a shoe, truncated at the summit; aperture lateral. *Animal*, body oblong, transparent, enclosed in the shell; head having two eyes and two retractile tentacula. — 5 species recent.

This singular shell is as transparent as glass. It is found in the Mediterranean and Indian seas.

6. Pneumodermon. — No shell. *Animal*, body oblong, head distinct; tentacula placed on each side the mouth; no eyes. — 3 species.

Found in the Atlantic Ocean and the seas of Amboyna.

## Order II.

### GASTEROPODA.*

Some of the animals of this order have no shell; others have a dorsal shell not enveloping them; and others, again, have one more or less hidden in the mantle. The body is straight, not spiral, having a foot united to it nearly the whole length, and used for creeping. They are divided into eight families: — 1. *Tritonidæ.* 2. *Dentalidæ.* 3. *Phyllididæ.* 4. *Semi-phyllididæ.* 5. *Calyptræidæ.* 6. *Bullæidæ.* 7. *Aplysidæ.* 8. *Limacidæ.* The seven first live in the sea, the last on land.

### Family 1. — *Tritonidæ.*†

The Mollusca which form this family have no shell, either external or internal. The body is long, and the respiratory organs distinct and placed above the mantle, either on the back or sides. They are all marine: six genera.

* *Les Gastéropodes*, Lamarck.
† *Les Tritoniens*, Lamarck.

7. Glaucus.
8. Eolis.
9. Tritonia.
10. Scyllæa.
11. Tethys.
12. Doris.

### Family 2. — *Dentalidæ.*

The branchiæ of this family are divided into two tufts of soft, flexible, club-shaped filaments, attached to a pedicle on the neck. — Only one genus is known. (See p. 30. note.)

13. Dentalium. — *Shell* tubular, regular, smooth or fluted, more or less curved, gradually

tapering to one end, open at both extremities. *Animal* long, slender, having a distinct head. — 21 recent, 1 fossil species.

Lamarck thought these animals belonged to the *Annulata*, but they are now placed amongst the *Mollusca*. The shell resembles in form an elephant's tusk. Some species are ribbed longitudinally, others transversely, but most of them are smooth. They inhabit the European and Indian seas.

### Family 3. — *Phyllididæ.**

Some of the shells comprised in this family differ from all other univalves, in being composed of moveable pieces at the back, formed to facilitate the motion of the animal. They are shaped like a boat, and adhere to rocks covered by the sea, the backs of turtle, and other marine objects; and so fast do they retain their situation, by exhausting the air beneath their bodies, that it requires a strong lever to detach them, frequently breaking the shell before the animal can be forced from its position. The others are particularly simple in form, presenting, in fact, scarcely any thing more than a conical cup or deep dish. They adhere to rocks and buildings washed by the sea; and although of a dull colour outside, are often very beautiful in the interior.—This family consists of five genera.

14. Phyllidea. — *Shell* none. *Animal*, body long, four tentacula attached to the head. — 4 species.

* *Les Phyllidiens*, Lamarck.

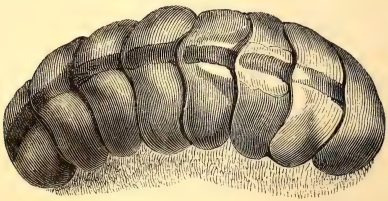
They are found in the Indian seas.

15. CHITONELLUS. — *Shell* divided into several small, disunited pieces, placed in nearly a straight line down the back of the *animal*,

which, in form and manner of progression, resembles a caterpillar. — There are 4 recent species.

The animal of the *Chitonellus* can move with great rapidity, turning its body with ease both to the right and left, as it creeps on the stalks of marine plants. It is found only in the seas of Australia and the Philippine Islands.

16. CHITON. —*Shell* boat-shaped, composed



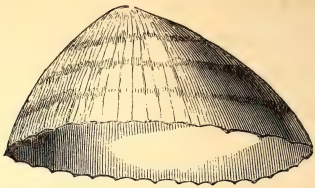
of about eight transverse pieces, folding over each other at their edges, and inserted into a

tough ligament. *Animal,* head not very distinct; no tentacula nor eyes, but having a long tongue rolled spirally, and armed with horny teeth; foot long. — 70 species recent, 1 fossil.

The ligament of this shell is sometimes fleshy, smooth, or wrinkled, covered with scales or tufts of hair; and in one species, the *Chiton spinosus,* it is armed with numerous thin long black spines. The interior of the shell is generally white; but some are green, and one species is of a beautiful rose colour. They often attain a large size, measuring several inches in length; but do not usually exceed two inches. They are found in most seas, the larger species coming from warm latitudes. Several, of a small size, are found on the British coast. They have the power of rolling themselves up into a ball, like the woodlouse or the hedgehog.

17. PATELLA. — *Shell* simply conical, without any perforation or internal appendage, and with the margin undivided; apex inclined towards the front part of the shell, where the head of the animal is situated, the mark of which can generally be traced in the interior by its

differing in colour from the rest of the shell. *Animal,* head very distinct, supporting two ten-



tacula, having eyes at the lower extremity; foot large, and round or oval.—There are 57 species recent.

The genus *Patella* is to be found in all parts of the world, chiefly on rocky coasts, and often where the sea breaks with considerable violence; many species, (from the shape of the shell corresponding exactly with that of the rock on which they have lived,) appear never to move from the spot they have once selected, and even form in most cases cavities in the rock itself by a power they possess of absorbing its substance: the *Patella vulgata* of the British coast has this property.

The *Patella cochlea* is found at the Cape of Good Hope; it lives almost exclusively attached to a larger species of the same genus,

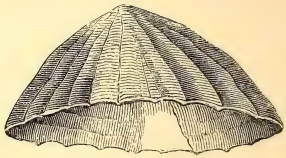
on the surface of which it forms a flat disk exactly the size of its mouth. To form these flat disks (of which there are so generally two, one on each side of the apex of the larger *Patella*, as almost to form a character of the species), and to assist in the increase of its size, the animal appears to absorb the coralline, or other similar substances, with which the larger shells are abundantly covered.*

There are other species, on the contrary, which do not remain entirely attached to the same place, but occasionally move; and others, again, which fix themselves to sea-weeds, which appear to be the food of the whole genus. They are particularly abundant at the Island of Cyprus and the Cape of Good Hope; where they are often found of a very large size, and are used as spoons by the Hottentots. The common English species is generally smooth on the outside; but many of the foreign ones are covered with ridges in rays from the apex to the circumference. Sometimes these ridges extend beyond the edge of the margin, and ap-

* Gray, Philosophical Transactions, 1833.

pear like the rays of a star. Some species were used for the table in former times, and the common species of the British coasts is still gathered by the poorer people for the same purpose.

18. SIPHONARIA (Sowerby). — *Shell* resembling the *Patella* in shape, but with an indented groove in the interior, extending from the apex



to the margin. *Animal,* head divided into two equal parts; no tentacula, nor visible eyes; the latter, at least, are very doubtful; foot moderate.—There are 19 species recent, and 2 fossil.

It is difficult, at first sight, to distinguish this shell from a *Patella,* the groove not being very perceptible; indeed, many authors class them together. They are found on the coasts of South America, New Holland, the Isle of France, and in the Mediterranean. The animals appear to be ornamented with various colours.

### Family 4.—*Semi-Phyllididæ.**

The animals of this small family only differ from the last in the situation of the branchiæ, which are placed on the right side of the body. The shells are cup-shaped, but nearly flat. There are only two genera.

19. Pleurobranchus. — *Shell* thin, nearly flat and obliquely oval; it is internal, or covered by the animal. *Animal,* head distinct, with two cylindrical tentacula; foot large.—There are 7 species recent.

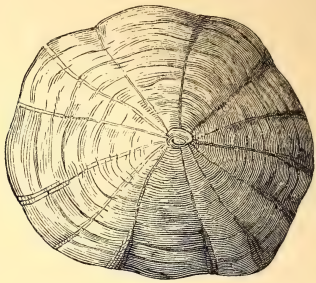
It is found in the Indian Seas and the Mediterranean.

20. Umbrella. — *Shell* rather irregular, slightly convex on the outside, and with a small, nearly central apex; margin sharp. *Animal,* head not very distinct, with four tentacula; foot very large. — There are 2 species recent.

The *Umbrella Indica* is met with in the Indian Ocean, and on the coasts of the Isle of France,

* *Les Semi-Phyllidiens,* Lamarck.

and is commonly called the Chinese Parasol: it is thin, rather transparent, and the interior



is marked with rays proceeding from the centre, and with a yellowish stain. The *Umbrella Mediterranea* is from the Gulf of Tarento, and is smaller than the preceding, also differing from it in not being marked with rays.

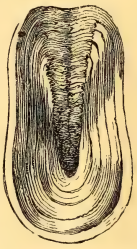
### Family 5. — *Calyptræidæ.**

This family is composed of animals that differ principally from the two last in the situation of the branchiæ, or respiratory organs. They are placed in a cavity appropriated to

* *Les Calyptraciens*, Lamarck.

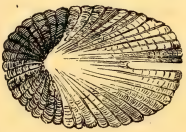
them on the back of the animal near the neck, projecting either within the cavity or above it. The shells, in many instances, resemble the *Patella* in form, though differing from it in other particulars. They are always external, and cover the animal.—7 genera.

21. PARMOPHORUS. — *Shell* oblong, depressed slightly, convex on the outside; apex small, and somewhat inclining to one end. *Animal*, head rather indistinct, with two tentacula, having eyes at the base; foot very large. — There are 3 species recent, and 2 fossil. This genus is found in New Holland and New Zealand.



The interior exhibits very strong muscular impressions, which are in some species marked with a blood red colour. It is often called the Duck's Bill Limpet.

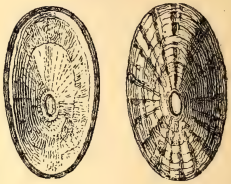
22. EMARGINULA. — *Shell* rather oblong, with the apex curved, and having a narrow slit or hollow in the margin, generally rayed on the outside. *Animal*, head



having two short tentacula, with eyes at the base; foot large and very thick. — There are 11 species recent, and 5 fossil.

These are all small shells, and are found in European Seas, at Amboyna, the Isle of France, New Holland, &c.

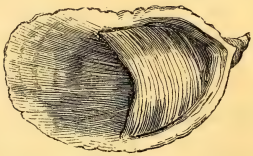
23. FISSURELLA. — *Shell* resembling a *Patella*, but having a round or oval hole at the apex. *Animal*, a large and distinct head, having two tentacula, with eyes at the base; foot large. There are 30 species, of which several are fossil.



The hole at the apex of this shell, which serves as a passage for water to the branchiæ of the Mollusc, which are situated near it, differs in form, varying also with the age of the shell, being in some species round, whilst in others it is oblong, or resembling a key-hole. The shells are generally thick and strong, and often delicately marked with alternate dark and light colours. A few species are found on the coast of England, in the same situations as

the *Patella;* but none are so beautiful as those which are found in the Tropics.

24. CREPIDULA. — *Shell* irregular in shape, and often very much flattened; the inside partly covered with a plate, so as to resemble a half-decked boat; apex not in the centre. *Animal,* head forked, having two tentacula, with eyes at the base; foot small. — There are 25 recent species*, and 1 fossil.



This is a curious and often a very beautiful shell. The *Crepidula Onyx* is of the most brilliant black in the inside, with the little half-deck, as it may be called, of a beautiful white, and having the margin of the shell tinged with a rich brown. These shells are found on rocks, and are often of a very irregular outline at the circumference; like the *Patella,* they constantly remain upon the same portion of rock, and form the margin to agree with its shape.

* Several of the recent species are also found in a fossil state.

They are found in great abundance at the Cape of Good Hope. One species frequently fixes itself upon other living shells, particularly upon the *Purpura*, and of course follows it in all its movements.

25. CALYPTRÆA. — *Shell* variable in form, and often very brittle, with a cup or funnel-shaped appendage in the interior. *Animal*, head large, having two long thin tentacula, pointed at the end, and furnished with eyes in the middle; foot not large. — 35 species recent, and 5 fossil.

The shell of the *Calyptræa* is often irregular in shape, similar to that of the last genus, and is often, like the *Crepidula*, found attached to large stones, shells, &c.: the outside is frequently covered with spines or ribs. It is generally thin, and not coloured. One species is called the Cup and Saucer Limpet, from its resemblance to those articles; it is brought from the South Seas. Another very curious species multiplies the little funnel-shaped appendage, so that it forms several little stages one above the other; it is called the *Calyptræa*

*tectum sinense.* Several species have the apex rather spiral. They are found in the seas of Europe, New Holland, &c.*

26. HIPPONYX (Defrance).—*Shell* obliquely cap-shaped, and sometimes, perhaps generally, supported on a solid shelly plate; the shell and

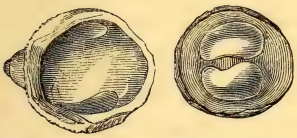


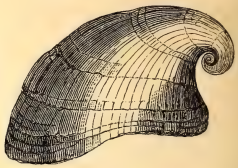
plate exhibit two strong muscular impressions, which are in the form of a horse-shoe. *Animal*, similar to *Pileopsis.*—9 species, recent and fossil.

These animals do not always form a plate; indeed, they are as often found without the sup-

* Mr. Cuming has lately found at the island of Zebu, one of the Philippines, several specimens of *Calyptræa equestris* on masses of dead coral about low water mark, having a testaceous plate attached to the mass to which the true shell adheres. The edges are finely crenulated, and turned up all round like a platter, as if to protect the margin of the cap-shaped shell which rests within it. — Reeve's *Con. Sys.*

port as with it; for when they adhere to other shells, the same object is gained by absorbing a suitable place of attachment, on which the same muscular impressions may be traced.

27. PILEOPSIS.—*Shell* irregular, conical; the apex lengthened, and recurved backwards; inside dull. *Animal*, head distinct, having two tentacula, with eyes at the base; foot very large.—There are 10 species recent, and 12 fossil.



This shell is frequently called, from its shape, the Fool's Cap Limpet. It is found in the European Seas principally; but some very large species are inhabitants of tropical climates, and are met with in the Pacific Ocean, and in the East and West Indies. The *Pileopsis Ungarica* is the only one of which the animal is known. The shells of this genus, like many of the species of *Patella*, as before remarked, are supposed to remain constantly attached to the spot they have once fixed upon, from the circumstance that the form of the margin of the shell agrees exactly with the portion of rock

on which they live, and preserves the same form to adult age. The *P. Ungarica* of the British Seas has the inside bright, and often of a beautiful rose colour.

Lamarck's system includes the genus *Ancylus* amongst the Patelliform shells, but it is now placed with the *Lymnæidæ*.

## Family 6.—*Bullæidæ*.*

The shells forming this family are very simple in form, but differ from the preceding in some respects; they are all slightly rolled up, without being spiral. There are three genera forming this family, which are described as follows.

28. Acera.—*Shell* none. *Animal*, oblong and flat; head, not distinct; foot very large. —1 species, found in the Mediterranean.

29. Bullæa.—*Shell* less rolled up than the subsequent genus, very thin, and hidden in the folds of the animal's mantle, without adhering to the body. *Animal*, head not distinct; no

* *Les Bulléens*, Lamarck.

tentacula.—There are only 2 species recent, and 2 fossil.

The *Bullæa aperta* is found in the European Seas; it climbs aquatic plants well, but swims badly. The *Bullæa hirundinina* is found at the Isle of France. The animal is of a beautiful blue colour.

30. BULLA.—*Shell* rolled up, aperture extending the whole length. *Animal*, head very indistinct; no apparent tentacula; hinder part of the body covered by the shell, which is external, and adheres by a muscle; foot large.—26 species recent*, and 11 fossil.

The *Bulla* can nearly, but not entirely, enter into its shell: it swims well, and is found in the seas of Europe, India, &c. The animal of the *B. lignaria* possesses a very singularly formed testaceous substance within its body, not no-

* Some of the recent species are also found in a fossil state.

ticed by Lamarck, but called by English collectors the gizzard. It is composed of three bony pieces, united by a muscular membrane; the two side pieces are triangular, the other is small.

The *B. Velum* is a very delicate shell, of a very light horn-colour, with a snow-white band about the middle, bordered on each side by one of a dark brown colour; the apex and base are white, both bordered by dark brown bands.

### Family 7.—*Aplysidæ.**

The Mollusca constituting this small family offer only two genera, and the shell with which they are furnished, if it can be called a shell at all, is a mere rudiment of one, forming only a covering for the gills; this at least is the case with the first genus; the other, in lieu of this plate of defence for its breathing apparatus, has a more defined shell, serving the same purpose.

31. Aplysia.—*Shell,* or operculum for gills,

* *Les Laplysiens,* Lamarck.

an oval, thin, nearly transparent plate. *Animal,* body creeping, oblong; head with four tentacula, furnished with eyes; mantle large. — There are 22 recent species.

These animals resemble large slugs; they swim easily, but crawl slowly: they are found in the Mediterranean Sea. Darwin, in his Journal*, says it feeds on delicate sea-weeds which grow among the stones in muddy and shallow water; and that he found in the stomach of several, small pebbles as in the gizzards of birds. He also mentions that, when irritated, it emits a fine purplish-red fluid, which stains the water for the space of a foot round, and that, besides this means of defence, an acrid secretion, which is spread over its body, causes a sharp stinging sensation. He found it at St. Jago.

32. Dolabella. — *Shell* oblong, thick, and slightly spiral on the posterior side, thin and flattened on the other. *Animal,* oblong, hav-

* Journal of Researches into the Geology and Natural History of the Countries visited by the Beagle.

ing four tentacula; it is doubtful whether it has eyes; foot large.—There are 11 recent species.

This animal resembles the *Aplysia* exceedingly, but has a more ample mantle; it inhabits tranquil bays in India, and the Isle of France.

### Family 8.—*Limacidæ.**

This family, like the last, has a very slightly developed shell, forming merely a covering for the branchiæ, and into which the animal is unable to enter. All the genera are terrestrial, breathing air, but preferring moist places to those perfectly dry. There are five genera, two of which do not possess shells, although they have a substance protecting the organs of respiration.

33. Onchidium. — *Shell* none. *Animal*, long; head with four tentacula; foot long. Found

* *Les Limaciens*, Lamarck.

in the Islands of Bourbon and Martinique in woods and gardens. — 8 recent species.

34. LIMAX. — *Shell* internal and rudimental. *Animal*, long; head tolerably distinct, having

two pair of tentacula; foot large and oblong. —19 recent species.

These animals are common everywhere, but particularly in the neighbourhood of ditches and gardens, where they often cause great damage. They are usually known by the name of *slug* in England.

35. PARMACELLA. — *Shell* merely rudimental, like the *Aplysia*, and defending the organs of respiration. *Animal*, oblong, having four tentacula, two of which have eyes, and all are retractile; foot large.—1 species.

This animal has been found in Mesopotamia.

36. TESTACELLA.—*Shell* very small, slightly ear-shaped, and spiral at the apex; mouth large, oval, having the left lip rolled inwards,

and the right sharp. *Animal,* body long like a slug, with the shell only covering the extre-

mity; head distinct, having four tentacula, the two largest of which have eyes at the summit; foot long.—2 species recent.

This animal is rarely observed, as it burrows under ground, where it lives upon earth-worms. One of the latter, an inch long, having been placed under a glass with three of these slugs, soon fell a prey to one of them; and another, three inches in length, although at first it succeeded in disengaging itself, was finally devoured by them, as well as two others of the same size which were subsequently introduced: two of the slugs were observed to make a simultaneous attack upon one of the worms, each commencing its repast at a different extremity.

The *Testacella haliotidea* is found in Europe; and M. Ferussac mentions a species, the *Testacella Maugei*, which was brought from Teneriffe

by Maugé to the Botanic Garden at Bristol, where it has become acclimated. As natives of England, they were first noticed by Mrs. Smith of Bristol, who found the shells casually scattered about her garden, and afterwards discovered the animal. They are common in Guernsey, and have been found at Lambeth. In winter they bury themselves from one to two feet deep in the earth, and are most above the surface from August to November.*

37. VITRINA. — *Shell* small, very thin, flattened, terminated by a short spire, the last whorl large; mouth large, and rather oval. *Animal*, body long, the shell only covering the extremity†; four tentacula, two of which have eyes at the summit. — 7 species.

These mollusca live in shady and damp places among moss and short grass, and are found in Great Britain, Germany, Sweden, Celebes, &c. These little shells are distin-

* Gray.

† The French naturalists say that the animal cannot entirely enter its shell ; but an English observer (Mr. Nilson) remarks that they not only enter it, but leave a space behind like the snails.

guished from young specimens of the *Helix* by their never being umbilicated or perforated; they greatly resemble them in other particulars.*

## Order III.

### TRACHELIPODA.†

The mollusca constituting this order differ from those which are comprehended in the last by having the foot attached to the neck, and the hinder part of the body coiled up and covered by a shell, which is always spiral, and to which the animal is fixed: this part of the body never leaves the shell, but the head and foot can also be drawn in at pleasure. The *Trachelipoda* are much more diversified in form than the last order, and are divided into a far greater number of genera, some of which inhabit the sea, others are found in fresh water, whilst others again are met with on land. Many of these are herbivorous, and many carnivorous; it will therefore, from the great

* Draparnaud.

† *Les Trachélipodes*, Lamarck.

extent of the order, be advisable to separate it into those two natural divisions, or into *Phytophaga* and *Zoophaga.*

## Division I. — Phytophaga.

The *Phytophaga,* or herbivorous *Trachelipods,* have the mouth of the shell entire; that is, without a notch or channel. Those which are marine procure their food from the sea-weed which they find floating on the surface or at the bottom; and the land species obtain abundance of nourishment in our gardens and elsewhere.

They are divided into ten families: — *Colimacidæ, Lymnæidæ, Melanidæ, Peristomidæ, Neritidæ, Janthinidæ, Macrostomidæ, Plicacidæ, Scalaridæ,* and *Turbinidæ.*

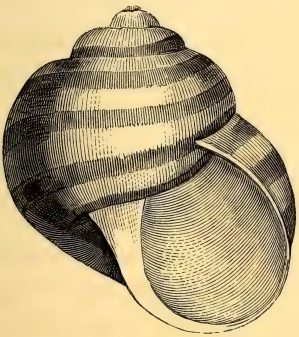
### Family 1. — *Colimacidæ.**

The animals of this family are entirely terrestrial, though usually fond of damp situations. Only two of the genera have permanent opercula, the others forming merely a tem-

* *Les Colimacées,* Lamarck.

porary epiphragma to protect them during severe weather, which they throw off on the return of warmth. The shells are spiral, with no projecting parts on the exterior, excepting those caused by increase of growth; the right lip or margin of the aperture is often recurved, or reflected outwards. There are eleven genera. The animals of eight of these genera have four tentacula, their eyes being placed at the summit, the others only two.

38. HELIX. — *Shell* globular, convex, or flattened; spire not much elevated; mouth wide,



not long, placed very obliquely to the axis of the shell; lips disunited by the projection of the last whorl, never pearly, but polished; um-

bilicus either covered or visible. *Animal*, head furnished with four tentacula, the two longest having eyes at the summit. Foot large and oblong. — There are 225 species recent, and 16 fossil.

Throughout the whole of nature there are very few classes of animated beings more abundant, or more completely spread over the surface of the earth, than this genus, the *Helix*, or common snail. It is found even in the most barren and desert places, feeding upon the miserable specimens of vegetation which may be found, and existing in great numbers in places entirely deserted by the other ranks of creation. It is equally adapted to the hottest and the coldest climates, the most cultivated and most barren situations. The *Helix aspersa*, or common garden snail, may be found at the foot of Chimborazo, in the forests of Guiana and Brazil, and almost all over the continents of Europe, Asia, and Africa; even the great desert of Zahara is peopled by them. On the shores of the Mediterranean they are a valuable article of food, when boiled in the shell and eaten with rice; and it has been conjectured

that they formed a portion of the food of the Israelites both in the desert and on their way to the Red Sea, the country in that neighbourhood being described by travellers as having a herbage under the trees completely covered with snails of a large size. They form in some countries, as Switzerland, Britany, and some parts of Germany, a considerable article of commerce. They are fed by thousands in places made on purpose for them. It is supposed the Romans also fattened the *Helix pomatia* in the same manner. Even at the present day the *Helix aspersa* is sold in Covent Garden market. It is used, boiled in milk, for diseases of the lungs. They are also sent to America from this country as a delicacy.

These animals become torpid about October (at least in England), and remain so during the winter, having first closed the mouth of their shells with an epiphragma which they throw off, and emerge when warm weather returns. Some of them form two or three of these doors, one within the other, so as completely to exclude the cold; and others bury themselves in the earth. The *Helix aspersa*,

which is the pest of our gardens, is more influenced by the weather than many of the smaller sort; for upon the first appearance of cold these animals creep into crevices and under stones, clustering and clinging together as if they were capable of communicating warmth by association. In the centre of the epiphragma is an exceedingly minute orifice, communicating with the lungs; and this minute hole, though not large enough to admit a drop of water, is of sufficient capacity for the passage of air for the purpose of extremely slow, but not totally extinct respiration.*

Many instances have been known of the great tenacity of life which snails possess. A gentleman received some species closely packed with marine shells from the Mauritius; the day after they were unpacked they were discovered wandering about, apparently uninjured from their long and close confinement. Some lived ten days; but a want of proper food or the uncongenial climate then killed them. There are instances, also, of

* Gray's edition of Turton's Manual.

snails having been some years in a cabinet, and on the shells being put into warm water to be washed the animals made their appearance alive.

These mollusca have the power of repairing their bodies when injured as well as their shells: a horn, or even the whole head, if cut off, will be reproduced, the animal keeping within its shell until grown again. The head, however, requires some months to be replaced.

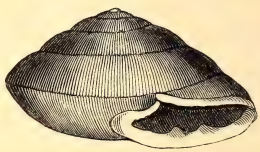
The *Helix pomatia* is said by some authors to have been introduced into this country from abroad, but others suppose it to be indigenous. It is almost peculiar to chalky and gravelly soils. The eggs of this species are globular, covered with a white opaque skin, and are about two and a half lines in diameter.*

Mr. Gray mentions having seen a specimen of a *Helix aspersa* curiously deformed by the obstruction of a young shell of the same species. The young specimen is attached to the spire, to which it had doubtless fixed itself during the dry season; and not waking from its torpor so early as its older companion, the

* Turton.

latter, when it commenced increasing the size of its shell, threw its new whorl partly over the smaller individual, which was thus enclosed in a prison formed by its own shell. In this instance the form of the larger specimen is not much altered; but about one half of the young shell projects above the spire.*

39. CAROCOLLA. — *Shell* flat; mouth wide, not long, with a thickened lip, and generally toothed within; circumference of the whorls



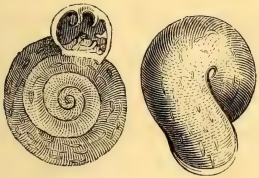
often angular; umbilicus either covered or visible. *Animal*, having a head furnished with four tentacula, the two largest having eyes at the summit; foot large and oblong. — 18 species recent.

These shells, and the animals inhabiting them, much resemble the *Helix;* the latter, however, have not the edge of the whorls

* Philosophical Trans. 1833.

angular. They inhabit all parts of the world, living in dry as well as damp situations. Turton mentions one species as a native of England, *C. lapicida*, found in the fissures of limestone rocks, and in woods.

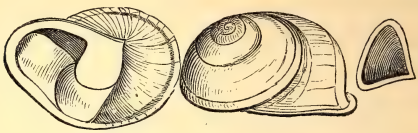
40. ANASTOMA.—*Shell* orbicular; spire obtuse; mouth toothed, and turned upwards in



the adult, nearly reaching the level of the apex. *Animal* like that of the *Helix*.—2 species, recent.

The structure of this extraordinary shell proves that in completing the last whorl, the animal carries it with the apex downwards, instead of its natural position upwards, which is the case with all other shells, and even with itself when young. It is very rare, and is brought from the East Indies.—Only 2 species are known, *Anastoma depressa* and *Anastoma globulosa*.

41. HELICINA. — *Shell* flattened; mouth semicircular, closed by a horny operculum; lip thickened, and columella often also thickened.



*Animal*, having a head furnished with a proboscis, and two tentacula, with eyes at the base on tubercles; foot rather short. — There are 19 species recent, and 1 fossil.

Some species feed on trees, and others on the ground; they are natives of the West Indies and other countries of the torrid zone. The operculum, which is permanently attached to the foot, is not spirally formed, but in concentric layers. — The *H. viridis*, from St. Domingo, is of a smooth shining green colour.

42. PUPA. — *Shell* cylindrical; spire long; aperture irregular, toothed, with the lips thickened, and unconnected at the upper part, the plaits on the left lip intervening. *Animal* like the *Helix*. — There are 56 species recent, and 2 fossil.

They are found principally in Europe, but a few species are from America: they derive their name from the resemblance of the shell in shape to the *pupa* or chrysalis of an insect. One species is named the *Pupa chrysalis.*— Several species are found in England under stones, old walls, and in woods.

43. CLAUSILEA.—*Shell* fusiform or spindle-shaped, rather resembling the last genus, but more slender; aperture irregular, rounded or ovate; lips united; summit obtuse. *Animal* like the *Helix.*—There are nearly 150 species recent, and 1 fossil.*

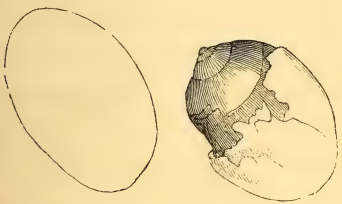
The *Clausileæ* inhabit mosses at the foot of trees. Some species are English, and many are found in other parts of Europe, particularly on the borders of the Mediterranean; and Russia and the Crimea produce a great number of curious species, which have lately been discovered; so that it is thought there are more than 150 species: a few also are American.

* There are 44 species described by Lamarck and Deshayes, but many more species have been discovered lately.

They are all small shells, the largest scarcely exceeding an inch in length. Within the mouth, in the last whorl but one, there is a little elastic shelly plate attached to the shell, and called a *clausium*, from which the genus takes its name. It is used to close up the aperture when the animal has retreated within its shell, and in that respect resembles an operculum, or epiphragma; but differs, inasmuch as the latter are either attached to the animal, or are loose and thrown off, whereas the *clausium* is fixed permanently to the shell. Turton mentions five or six as natives of England. Many of the species are sinistral.

44. Bulimus. — *Shell* oval, turreted, last whorl large; aperture having the margins disunited at the upper part, long, not wide; lip thickened and reflected in the adult; spire obtuse, but much more prominent than in the *Helix*. *Animal* like the *Helix*. — 135 species recent, and 16 fossil.

These shells are found in almost every part of the world, from the torrid to the frigid zones; in the former they attain a large size, and are beautifully coloured, often with lemon, amber, and sea-green, which rarely exist amongst other shells. Many of the species are reversed. They are more commonly found on islands, or on the margin of the sea amongst rocks and trees, than in the interior of the country. The eggs of the *Bulimus hæmastoma* are large, even sometimes reaching the size of a pigeon's egg, and are represented in the annexed fig.



A specimen of the *Bulimus ovalis* was once brought from Rio Janeiro, and placed in a hothouse at Chiswick; it lived for more than a year, and fed principally on lettuces and cab-

bages, the former of which appeared to be its favourite food. It would sometimes, after devouring part of a large lettuce, remain for some days without touching food or moving from the spot. During the day it was usually in a dormant state, and remained in the shade; but towards evening, when the house became damp and warm, it would move about.

Some specimens that were brought from Chili continued in a state of torpidity for seventeen or eighteen months, and one even more than two years, and revived in this country. They were sent to Messrs. Loddiges' gardens, at Hackney, where they lived for eight months in a hot-house fitted for palm-trees: they had constructed a parchment like epiphragma, which they were observed partly to eat when they revived. They had been packed in cotton, in a box, from the period of their capture. Mr. Cuming brought many new species from South America. The *B. rosaceus* he found adhering to the under side of stones, generally among bushes, and close to the edge of the sea shore within reach of the spray. He also met with them at the top of hills about

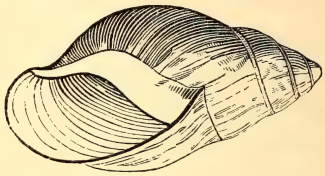
one thousand feet above the sea; they were adhering to the lower leaves of an aloe-like plant. In the spring they burrow in the sand, and lay their eggs about two inches below the surface. When they hybernate, they adhere so fast to the stones and plants that they can hardly be taken without breaking the shell.* One species, the *B. decollatus*, as it advances in age always loses the upper volutions; but whether from accident or design appears uncertain. It, however, generally closes up the broken end; and the probability is that as the animal enlarges in growth it recedes from the smaller volutions, closes them up, and these neglected portions fall off. Turton mentions a colony of them being discovered in a greenhouse in Devonshire, lodged in the earth under the wood-work, whence they wandered abroad in the summer. No foreign earth was ever known to have been admitted into the house; and they were considered by the gardeners as natives.

Other species, particularly *B. articulatus*, are

* Penny Cyclopædia.

met with in such numbers in some parts of Cornwall, that it is impossible to take a step without crushing them. It is the prevailing opinion that they contribute much to fatten the sheep which browse upon the herbage where they are met with, which is principally on sandy maritime pastures.

45. ACHATINA. — *Shell* somewhat like the last genus, but longer; the lip thin, and ap-



parently notched at the base of the pillar, from its rolling over; aperture about half the length of the shell; no operculum. *Animal* like the *Helix*. — 35 species recent, 1 fossil.

Some of the *Achatinæ* are the largest of all known land shells; they live always near water about trees, and are very plentiful in Africa, particularly at the Cape of Good Hope. Some are found in the West Indies; but very few in Europe. Two small species, *A. acicula* and *A.*

*octona*, are found in England, among the roots of trees at the base of limestone rocks. Many of them, as the *Achatina zebra*, are covered with a thick epidermis, but others are destitute: a few are constantly reversed or sinistral shells. The *Achatina columnaris* is one of the most remarkable of land shells; it is reversed, and the columella forms a winding pillar, visible within, quite to the summit of the spire.* A small species found in the South Sea Islands is strung by the natives, and used for an ornament.

46. SUCCINEA. — *Shell* oval, small, thin and transparent; spire very short, consisting of only two or three whorls; right lip thin, left smooth; aperture large; no operculum. *Animal* like the *Helix*. — There are 10 species, recent.

The animal cannot entirely enter its shell; it lives upon herbs and shrubs on the borders of rivulets, and appears to be almost amphibious. It is found in England and other parts

* Sowerby.

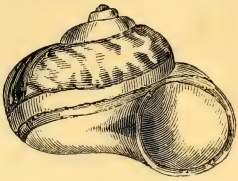
of Europe, Van Diemen's Land, Guadaloupe, &c.

47. AURICULA. — *Shell* oval; spire short and obtuse; right lip in some species thickened, in others sharp; mouth toothed and oblong, rather in the form of an ear, often very narrow. *Animal* having a head furnished with two tentacula, and eyes at their base; foot short and narrow.—There are 30 species recent, and 15 fossil.

Several species are European; others are found on the banks of rivers in Brazil and Madagascar, and the Indian and American islands. The name is derived from a fancied resemblance to the ears of some animals: they are for the most part covered with an epidermis, but some are frequently delicately sculptured.

Montford proposed a new name for those shells which have slightly raised varices, and the mouth toothed on both sides. He calls them *Scarabus*. They appear to be found in marshy places; though one species, *S. umbrium*, is said to have been found on the tops of mountains by Captain Freycinet.

48. CYCLOSTOMA. — *Shell* either flattened or turreted; mouth circular; the margin of both lips united, and slightly turned back; closed by a shelly or horny operculum. *Animal*, head having two tentacula with eyes at the base; foot oblong. — 45 species recent, and 10 fossil.



These shells vary much in form, some being very flat, others having the apex lengthened out, and being more conical; they all have the mouth round.

The *Cyclostomata* are found principally in the torrid zone; but one species, the *Cyclostoma elegans*, is a native of Britain: they inhabit woods, and are found amongst moss, stones, &c.

### FAMILY 2. — *Lymnæidæ*.*

This family consists of amphibious animals with two tentacula, having eyes at the base. They inhabit fresh water, and rise to breathe

* *Les Lymnéens*, Lamarck.

the air on its surface. The shell is spiral, with the exception of one genus; the external surface generally smooth, and the right margin of the aperture always sharp and not reflected. They do not possess an operculum. There are four genera.

49. PLANORBIS.—*Shell* flat and disk-shaped; mouth semicircular, and removed from the axis of the shell; whorls apparent on both sides; umbilicus large; no operculum; many species reversed. *Animal* having two very long tentacula, with eyes at the base; foot oval and short.—22 species recent, and 9 fossil.

This genus inhabits lakes and ditches in every part of the world; many species are common in England, and one or two are found in America with thickened rims. Some of the species are so much flattened that it is difficult to distinguish the upper side from the lower; but Deshayes says it may generally be done by observing that the upper part of the lip is more advanced than the lower. They are usually thin and fragile.

50. PHYSA.—*Shell* oval or oblong, smooth and thin; aperture contracted above; inner lip smooth, outer very thin; no operculum; shell generally reversed. *Animal* having two long tentacula, with eyes at the base; foot long; mantle large, so as to cover part of the shell, and very transparent.—10 species recent, and 1 fossil.

These animals are most frequently found on the under side of the leaves of aquatic plants: they have a very singular way of adhering to the surface of the water with the shell downwards, and crawl in that direction with as much apparent ease as on a solid surface, and they will occasionally let themselves down gradually by a thread. This power of crawling under water against its surface is not wholly confined to this and the following genus. Many species are found in Europe, others in Africa, America, &c.

51. LYMNEA.—*Shell* oval, inflated, thin; spire small and pointed; aperture oblong, sometimes very large; occasionally a fold on the columellar lip; no operculum. *Animal*

having two triangular tentacula, with eyes at the base; foot oval and thin. —20 species recent, 12 fossil.

This genus is often united with the last, as they are similar in most respects, differing chiefly in the direction of their spires; (the *Physæ* being generally sinistral, and the *Lymneæ* dextral shells;) and also in the oblique plait on the columella. They are abundantly found in our rivers and ponds (particularly the latter, as they appear to prefer stagnant water), and in other parts of Europe, Africa, and America: one or two species have been mentioned as natives of India. They feed on aquatic plants, and come to the surface of the water for air, like the preceding genera; the number of their eggs is very great, and they are deposited on stones, stems of vegetables, &c. in long masses enveloped in a glairy substance. Darwin mentions finding *Lymneæ* in great numbers in a lake near Rio de Janeiro, into which the inhabitants assured him the sea annually, and sometimes oftener, entered, and made the water quite salt.

52. ANCYLUS. — *Shell* oblong, small and transparent; apex rather pointed, and bent to the right, somewhat resembling a *Patella* in form; but the apex is posterior, whereas that of the *Patella* is anterior. *Animal*, head very large, having two tentacula, with eyes at the base; foot large.—5 species, recent and fossil.

The *Ancylus* is found only in fresh water, in ponds and brooks, where it attaches itself to flags and other aquatic plants, and also to stones. It swims about on the surface of the water, with the back downwards. It is nearly amphibious; for in summer, when the brooks are dried up, it remains in the soft mud until the return of rain. It is also often found out of the water, and only within reach of the spray of a waterfall.*

* Turton's Manual. In Lamarck's system this shell is placed with the *Calyptraciens;* but it is now ascertained that the animal greatly resembles the *Physa* in form and habits, and it has therefore been removed to the family now described.

## Family 3. — *Melanidæ*.*

The *Melanidæ* are all fluviatile shells, mostly exotic, and covered by a black or greenish brown epidermis. The right lip is always sharp, and the lips disunited. The *animal* has two tentacula and an operculum, and breathes only water. There are two genera.

53. Melania. — *Shell* oblong, often turreted, exterior wrinkled, and the whorls sometimes surmounted with spires or knobs; aperture pear-shaped; operculum horny; almost all have a brown or black epidermis. *Animal* having two tentacula, with eyes at the base; foot generally short and thick. — 36 species recent, 7 fossil.

Found in a great many parts of the world; abundant in Asia, but rare in Europe †, except in a fossil state. They inhabit rivers.

* *Les Mélaniens*, Lamarck.

† *M. helvetica* is found in fresh waters in Switzerland and Italy.

54. MELANOPSIS. — *Shell* turreted; mouth nearly entire, having a slight notch at the base, and occasionally one also at the upper part of the lip; spire having from five to fifteen whorls; inner lip thickened at the upper part; operculum horny. *Animal*, head furnished with two tentacula, having eyes at the base; foot very short.—There are 9 species recent, and 7 fossil.

These shells are found in great abundance in the fresh waters of the south of Europe and Africa; also in Syria, and in the rivers Tigris and Ohio.

The genus *Pirena* of Lamarck is now suppressed, and the species placed with the above.

### FAMILY 4. — *Peristomidæ.**

The animal of this family is similar to that of the last; but the shell is conoid or discoidal, and the margins of the aperture united. All the four genera have opercula, and a thin brownish green epidermis. The animal respires water.

* *Les Péristomiens*, Lamarck.

55. VALVATA. — *Shell* cone-shaped, or flattened; whorls rounded and distinct; mouth round, or nearly so, with the lips united and acute; an operculum.

*Animal* having a very distinct head, prolonged into a kind of proboscis, and furnished with two very long tentacula, with eyes at the base; foot short. — There are 6 species recent, and 2 fossil.

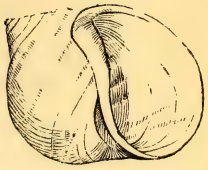
Found only in rivulets and ponds in Europe and North America.

56. PALUDINA. — *Shell* cone-shaped, having the whorls rounded; aperture roundish, angulated above; margins of the inner and outer lip united; operculum horny; shell covered by an epidermis.

*Animal*, head furnished with a proboscis, and two tentacula having eyes at the base; foot rather triangular. — 21 species recent, and 13 fossil.

This genus is distributed all over the world, and is usually found in fresh waters, rivers and ponds; there are, however, some species found in salt marshes, but none in the sea.

57. AMPULLARIA. — *Shell* generally large, thin and globular; spire very short; mouth semicircular, with the lips united, the outer being acute; operculum thin and horny, and rarely calcareous; the shell has an epidermis, and an umbilicus varying in size. *Animal* having a large head furnished with four tentacula, with eyes at the base of the two longest; foot oval and large. — 27 species recent, and 16 fossil.



The Mollusca forming this genus are found in the rivers of Africa, India, and South America, but have not been discovered in Europe or North America. They are found in rivers and ditches; one species, the *Ampullaria ovata*, inhabits the Lake Mareotis, where the water is salt, and another the brackish water near Rio de Janeiro.* Some of the African species have reversed shells, and all that are natives of Africa and America have the operculum horny: those, on the contrary, which come from India, have it usually shelly,

* Darwin.

and are furnished with an internal groove for its reception parallel to the mouth, which is thickened.*

The animals possess the peculiarity of a large bag opening beneath, and situated on one side of the respiratory organs; this they fill with water, by which means they can exist for a considerable period out of their natural element. Specimens have been brought from Egypt to Paris alive, although packed up in sawdust; and, as a further instance, the following may be adduced. A box sent to M. Caillaud, containing a number of river shells from the Nile, was delayed four months on its road, and when it reached Paris was in such a state, from the putrefaction of the greater part of its contents, that they were all thrown into water. A few hours after a great number of living *Ampullariæ*, which had been shut up in this mass of putrefaction, were discovered creeping quietly about, and some of them lived four and six months after. The Indian species lay globular eggs, of a pale green colour, about the size of small peas, which are found in

* Swainson, Zoological Illustrations.

clusters attached to sticks or other things in the water; when dry, they have a beautiful appearance.

M. Quoy has proposed to form two species of Lamarck's genus *Ampullaria* into a distinct genus, which he calls *Ampullacera*. The animal is totally different, though the shells greatly resemble each other.

58. Ampullacera (Quoy).—*Shell* rather thick, globular; mouth round or oblique, having the lips united; spire short; umbilicus very deep; operculum horny, thin, and having sometimes a projection. *Animal*, head large, flat, divided into two lobes, and having two sessile eyes; no appearance of tentacula; foot short and square.—2 species recent.

This mollusc is found in great abundance in New Zealand, living in pools of brackish water, and buried in sandy mud. It is eaten by the natives. When the animal is touched it enters very deeply into its shell, at all times is much hidden by it, and sometimes even fills the entrance with earth.

## Family 5. — *Neritidæ.**

The shells constituting this family are chiefly distinguished by the smallness and flatness of the spire, which appears placed on one side; the mouth is generally semicircular, being half closed by a flat partition, which forms the left lip. Some are marine, and others fluviatile; they have all an operculum of a peculiar form, having a little projection which slips under the partition of the left lip, and thus securely closes the mouth. There are four genera.

59. Navicella. — *Shell* oblong, convex above, with the apex straight and bent down to the edge, not spiral; inner lip thin, and assuming the form of a plate across one end of the aperture; shell altogether much resembling a *Patella*, but having an operculum which is shelly.

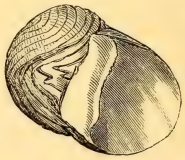
*Animal*, head very large, having two tentacula, the eyes placed on the summit of two

* *Les Neritacées*, Lamarck.

small protuberances at their base; foot large.—There are 3 species, recent.

These Mollusca are fluviatile, inhabiting the clear rivers of India, the Isle of France, &c.: they creep well on the rocks, and do not continue fixed to one spot, as the *Patella*. In the Isle of France they are made into broth for invalids.

60. NERITINA.—*Shell* thin, having no umbilicus, and being globular or oval; mouth semicircular; left lip flattened and sharp, right lip destitute of teeth. *Animal*, head large, having two tentacula, with eyes at the base; foot short.—54 species recent, and 9 fossil.



The *Neritinæ* are fluviatile, and are found in the East and West Indies, the Isle of France, &c.; they are exceedingly pretty shells, the lines and marks, when looked at through a microscope, being often very beautiful. They are worn as ornaments by the Indians. The *Neritina corona* is coated with a black epidermis, and has a row of long sharp spines: the *Neritina viridis*, a very small green species, found in

the West Indies, is doubtful as regards its habits, some authors supposing it to be marine.* Many of the species are covered with an epidermis. The *N. fluviatilis* is found in the rivers of England adhering to stones. This shell is often covered with incrustations.

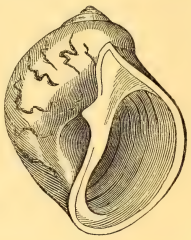
61. NERITA. — *Shell* thick, having no umbilicus; spire nearly hid; mouth semicircular; inner lip flattened, and frequently toothed, as well as the outer; operculum shelly. *Animal*, head furnished with two pointed tentacula having eyes at the base; foot large. Marine. — There are 27 species recent, and 10 fossil.

The shells of the *Nerita* are often beautifully marked and sculptured; they inhabit the Eastern and American seas, a few species only being European. The *Nerita peloronta* is called the Bleeding Tooth, from the red appearance of the teeth on the inner lip. Many of the species

* Gray says it is only found in the sea.

are very common in the West Indies, Moluccas, &c. Some naturalists unite this and the preceding genus, as their form is very similar; but Mr. Gray describes their opercula as quite different. That of the *Neritina* is solid, shelly, and furnished with a thin, flexible, outer edge; the *Neritæ* have a horny operculum, covered on both sides with a hard shelly coat, which may be separated from the horny part.

62. NATICA. — *Shell* smooth, or without an epidermis, having an umbilicus, which, however, is in some species covered by a coating of shelly matter; outer lip sharp, inner lip and inside smooth; operculum shelly. *Animal,* head very large, having two tentacula with eyes at the base; foot large and thin. — There are 45 species recent, all marine, and 11 fossil.

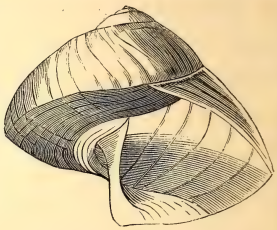


Found on the coasts of England, and also those of India, China, New Holland, &c.

## Family 6.—*Janthinidæ.**

This family consists only of one genus. The shell is marine, and the animal breathes water only.

63. Janthina.—*Shell* round, whorls slightly angulated; right lip forming an angle at the lower part of the mouth with the columella, which is produced so as to meet it; very fragile, thin, and of a purple colour. *Animal*, head furnished with a round proboscis armed with little hooks; two tentacula with eyes at the base; the under surface of the foot furnished with a vesicular or bubble-like apparatus, which prevents the animal from crawling, but enables it to float on the surface of the water with the shell downwards.—2 species, recent.



One species, *J. fragilis*, is found on our coasts

* *Les Janthines*, Lamarck.

and those of Ireland, (in consequence of the gulf stream and westward winds,) and in the European seas; the other, *J. globosa*, is from Madagascar, the tropical seas, and the Mediterranean. They are seen floating on the sea, suspended by the foot, from which a violet-coloured liquid is emitted when the animal is touched or injured. The shell is so extremely brittle that it is seldom met with unbroken. Sir Everard Home states that the animal carries its eggs on its shell for some time.

### Family 7. — *Macrostomidæ*.*

The *Macrostomidæ* are of a very simple construction as far as regards the shell: the spire is small; so much so, indeed, that the mouth of the shell is nearly as large as the shell itself. They are usually highly iridescent in the inside, and have no operculum. They are all marine, and are divided into four genera.

64. Sigaretus. — *Shell* ear-shaped, not

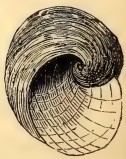
* *Les Macrostomes*, Lamarck.

pearly inside, nor perforated with holes; right lip thin. *Animal*, head large, having two tentacula, with eyes at the base; foot very large. — 4 species, recent.

The few species that are known are brought from the Indian seas, the Atlantic Ocean, and the Mediterranean. The shell is almost hidden within the mantle of the animal, and from this cause, probably, is devoid of colour: some species are solid and thick, others thin.

M. Adanson found abundance of these shells separated from the animal in the sand at the mouth of the Niger.

65. STOMATELLA. — *Shell* ear-shaped, oblong; aperture large, and also oblong, not perforated; interior very pearly. *Animal* not known. — There are 5 species, recent.



They are brought from Java, India, New Holland, &c.

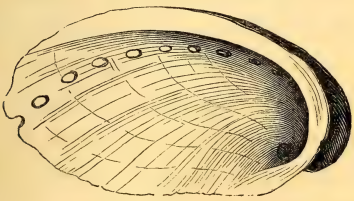
66. STOMATIA. — *Shell* not perforated; a rib or raised line on the back; spire rather more

prominent than the last genus; ear-shaped; mouth large, oblong, interior pearly. *Animal* not known. — There are 2 species, recent.

These shells are brought from the East Indies and New Holland.

This genus and the preceding are now generally placed together under the name of *Stomatia.* The shells are distinguished from those of the *Haliotis* by being destitute of holes, and from the genus *Sigaretus* by being pearly.

67. HALIOTIS. — *Shell* flat, pearly inside, slightly spiral at one end, and having one side

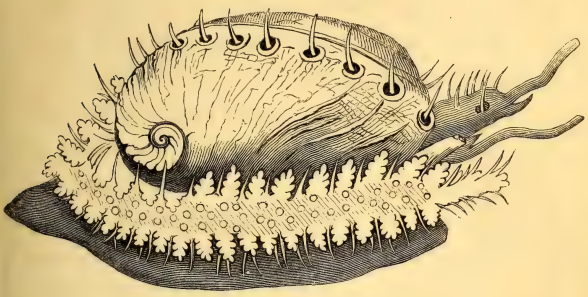


perforated with small holes; aperture almost as large as the shell. *Animal,* head large, having two long round tentacula, with eyes at the base on footstalks; foot very large, having

the margin fringed all round, resembling a double row of festoons. — 15 species, recent.

The form of this shell somewhat resembles that of the human ear, and it is from that circumstance frequently called the Ear-shell; one species, from its length, having received the name of the Ass's Ear. The outside is generally rough, worn, or covered with marine substances; the inside presents the same enamelled appearance as mother-of-pearl, and exhibits the most beautiful colours. The holes with which the shell is perforated are for the passage of the lobes of the animal's mantle, and are made at regular intervals, as it increases in size. It is observable, however, that as each new one is formed the one nearest the spire is closed up; so that there are generally the same number open at a time, and seldom more than seven or eight. The annexed cut is a representation of one of the species of this curious genus, with its living inhabitant, which, notwithstanding its apparent size, can be covered by the shell. In its state of rest, it is able to adhere with such tenacity to the substance it is fixed upon as to be removed with

very great difficulty, although it can detach itself with ease. It is always found near the



surface of the water, and on serene nights feeds on the vegetation which springs up on the shore.

The *Haliotis* is found in New Holland, China, the Cape of Good Hope, the Moluccas, &c.; but the most common species which is preserved in conchological collections is the *Haliotis tuberculata*, represented in the last figure, which is found in great abundance on the coasts of Guernsey and Jersey, where the animal is used for food; and the shells are frequently arranged in patterns on the outside of the cottages, being cemented into the mortar, with the inside exposed: these have

a very beautiful appearance when the sun shines upon them. They are occasionally found upon our coasts; but as it is only after violent storms, they are supposed to have been brought from other shores.

In the islands of the South Seas these beautiful shells are used to ornament the boats of the natives, and to make a kind of musical instrument. They also form the thick left lip of the aperture into fish-hooks. The natives of New Zealand use the shell as spoons. Pearls are sometimes found in them.

### Family 8. — *Plicacidæ.* *

This family of the *Trachelipoda* is distinguished by having the pillar plaited, which gives the shells an appearance of having the mouth toothed. There are only three genera, all marine.

68. Tornatella. — *Shell* small, and oval; spire small, pointed, and usually striped transversely; pillar having one or two thick plaits; outer lip thin; no epidermis. *Animal* not known. — 6 species, recent.

* *Les Plicacées,* Lamarck.

These shells are found on the shores of the Indian Ocean and Senegal; and one species, *Tornatella fasciata,* inhabits our own coasts. They form an operculum.

69. MELAMPUS (Montford). — *Shell* small, conical; spire depressed; pillar or inner lip having one or two plaits, outer lip thickened inside; no operculum. *Animal* having two tentacula, with eyes at the base. — Species doubtful.

This genus inhabits the shallow parts of the coast of the West Indian Isles, where it is found creeping on the mangrove roots. It is perfectly amphibious, and very tenacious of life.

70. PYRAMIDELLA. — *Shell* turreted; pillar having three plaits; outer lip thin; no epidermis. *Animal* not known. — There are 11 species recent, and 8 fossil.

This group of shells is found in the Indian and American seas.

## Family 9. — *Scalaridæ.**

The shells forming this family are spiral, but the whorls of some of the species do not wrap over each other so decidedly as in many others; indeed, in many species, they do not touch. Modern authors introduce a few new genera. The third and fourth mentioned here have been placed in many different parts of the system. Lamarck mentions the first amongst his *Annelides.*† Rang says, in his *Manuel des Mollusques*, that when he was seeking the animal of the *Magilus* in India he was struck with its analogy to *Vermetus.* It will therefore be placed near that genus, as its long tube (caused by the circumstances hereafter mentioned) in some degree resembles the loosely twisted whorls of that shell, and the young student will on this account find the *Magilus* placed amongst those which resemble it in form. The family contains six genera.

* *Les Scalariens*, Lamarck.

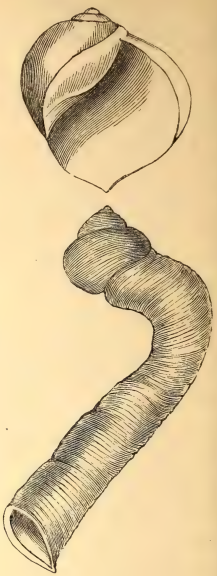
† See page 36.

71. VERMETUS. — *Shell* thin, tubular, only slightly twisted; mouth round; lips united. *Animal*, head indistinct, having two tentacula with eyes at the base; foot cylindrical. — 1 species.

This is a very remarkable shell, both in appearance and habits. The spire is extremely irregular in formation, with the whorls perfectly separated from each other; and the animal, although of the tribe *Trachelipoda*, with a foot adapted for creeping, continues attached to one spot by the pointed extremity of the spire. They may be found in groups, twisted together in great numbers, in the seas near Senegal. There is only one species, the *Vermetus lumbricalis*.

72. MAGILUS. — *Shell* ventricose; spire short, consisting of three or four whorls; aperture longer than wide, without any notch, but an angle at the base. The last whorl, abandoning altogether the spiral form, produces a long tube, which is compressed laterally, especially on the side of the base of the shell; aperture elliptical. *Animal* but little known;

an operculum.* 1 species, recent.

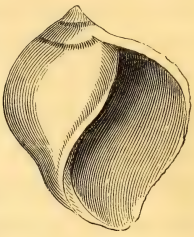


When in the young state this curious shell presents all the characters of a regular spiral univalve. The animal establishes itself in the excavations of madrepores; and as the coral increases around it, the *Magilus* is obliged, in order to have its aperture on a level with the surrounding surface, or near it, to construct a tube, the growth of the coral determining its length. As this tube goes on increasing, the animal abandons the spiral for the tubular part of the shell; and in the operation it leaves behind no partitions, but secretes a compact calcareous matter, which reaches to the very summit of the spiral part; so that in an old specimen the posterior part of

* Dr. Rüppell.

the shell presents a solid mass. One species only, *Magilus antiquus*, is known. The colour is white, more or less pure.

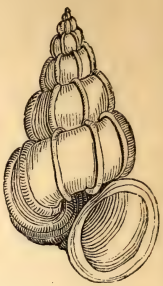
73. LEPTOCONCHUS (*Rüppell*). — *Shell* subglobular, delicate, fragile, translucent; spire low, and nearly effaced by the encroachment of the last whorl; aperture large, and in form somewhat like the letter S reversed; the two margins not united; the right delicate at all ages, and a little expanded; no columella or umbilicus. *Animal*, head with a proboscis; two tentacula, with eyes in the middle; foot moderate in size; no operculum. — 1 species.



The shell of this genus is of a dirty milk-white, and is furrowed externally. It is found in the Red Sea, where it is embedded in calcareous masses of *Polyparia*, and having no communication with the water except by a moderate opening.*

74. SCALARIA. — *Shell* turreted, with or

* The descriptions of the two last genera are taken from the Penny Cyclopædia.



without a pillar; mouth nearly round, lips united; longitudinal bands the whole length of the shell; operculum horny. *Animal* having two tentacula, with eyes at the base; foot short and oval. — 7 species recent, and 5 fossil.

In these shells it is easy to distinguish the different periods of growth, as the mouth is always bordered by a thick lip, which is retained, and produces a band; in the adult shell these are very numerous, and from their appearance have given the name to the genus, of *Scalaria*, or *Staircase*. The seas of China and Japan produce the rare species *Scalaria pretiosa*, for fine specimens of which, $3\frac{1}{2}$ inches in length, formerly the enormous price of one hundred guineas has been given; they are now, however, much more frequently met with, and may be obtained for a few shillings. In this species the whorls only touch each other at the thickened lip, and occasionally a specimen is found in which they are perfectly separated. The *Scalaria communis* inhabits our own coasts.

The following genus, described both by *Deshayes* and *Rang*, will be introduced.

75. Rissoa (*Fréminville*). — *Shell* oblong, turreted; no umbilicus; generally remarkable for its longitudinal bands; mouth oval, oblique; the two lips united, or nearly so; the right not reflected, but thickened; a calcareous or horny operculum. *Animal*, foot short and round.—44 species, recent and fossil.

The species of this small shell are brought from the Mediterranean, the seas of Senegal, and the European Ocean. They are generally found on sandy shores.

76. Delphinula. — *Shell* very thick; spire depressed; umbilicus large; exterior rough, with tubercles; mouth pearly; lips united; operculum shelly. *Animal*, head distinct, having two tentacula, with eyes at the base; foot short and round.—3 species recent, and 10 fossil.

All the species forming this genus are found in the Indian Ocean. Some of them have the whorls entirely separated.

## Family 10. — *Turbinidæ.**

This family constitutes the last of the *Phytophagous Trachelipoda.* The animals breathe only water, and all are confined to the sea. The shell is turreted, conoid, or pyramidal; the aperture round or oblong; and they appear all provided with an operculum. The three first genera are more pyramidal than the rest, and will stand upright on their base, with the axis of the shell scarcely, if at all, inclined. There are eight genera.

77. Solarium. — *Shell* nearly discoid, not perlaceous; internal edge of the whorls visible

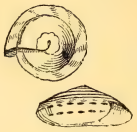
in the umbilicus, which is very wide; mouth almost square; margin thin. *Animal* resembles that of the *Trochus.* — There are 7 species recent, and 11 fossil.

The various species of this genus are brought

* *Les Turbinacées*, Lamarck.

from the coasts of New Holland, Tranquebar, and from the Indian and Chinese seas; they also frequent the shores of the Mediterranean, near Alexandria. The *Solarium perspectivum*, represented in the figure, is frequently called the Staircase-shell. Specimens have been found three inches in diameter; and as they are elegantly marked with black and straw colour, they are often very beautiful objects.

78. ROTELLA.—*Shell* small, outside smooth and polished; left lip very thick, and spreading over the under surface so as to form a callosity; right lip sharp at the edge; operculum horny. *Animal*, head having two very long and pointed tentacula, with eyes at the base; foot short.—5 species, recent.



From the Mediterranean, Indian, and Javanese seas.

79. TROCHUS.—*Shell* conical; spire elevated; circumference of the whorls more or less angulated, often quite sharp; mouth transversely depressed; edge of the outer lip disunited from the inner at the top; inner lip curved, rather oblique at the base; sometimes

an umbilicus; operculum generally horny, thin, and spiral, with many whorls. *Animal*, head

distinct, having two tentacula with eyes at the base; foot short and round. — There are 69 species recent, 9 fossil.

This genus is distributed all over the world, and presents a great many species. The *Trochus agglutinans**, from the Antilles, is remarkable for the singular habit of accumulating, during its formation, different substances which adhere to its shell. It is often found covered with stones, corals, small shells, and fragments of all kinds, and on account of this curious propensity it has been named the *Carrier:* it is supposed that it does this for the purpose of strengthening its shell, which is very thin and brittle, and that it causes the substances it collects to

* This species of *Trochus* has been formed into a genus by Montfort, and called *Phorus*.

adhere to it by bringing its shell into contact with them whilst the shelly matter is still in a partially liquid state. Mr. Swainson mentions* that amongst some fresh-water shells he received from Brazil he found two small ones resembling a *Helix*, and was led to examine them, as their outside was covered with particles of dirt and sand. On placing them, however, under the magnifier, he was surprised to find that the shells were actually composed of little stones and grains of sand only, agglutinated together with so much skill by the animal, that the regular turns of the spire and the form of the umbilicus were most accurately preserved. They were, in short, fresh-water Carriers. The *Trochus longispina*, from India, has the circumference ornamented by a row of long spines, of a silvery or gold colour, placed at regular distances, and somewhat resembling the rays of the sun as they are represented in carved work; the shell itself is also of a golden colour. The *Trochus jujubinus*, found in the seas of the Isle of France, is remarkable for its peculiar colour-

* Treatise on Shells and Shell-Fish.

ing, the upper whorls being blackish, whilst the apex and two last are red or flesh-coloured. Many species are very iridescent at the mouth and under the epidermis. There are some species common on our coasts, but none attain the beauty of the foreign varieties.

80. MONODONTA. — *Shell* oval or pyramidal; lips disunited at the upper part, the right being occasionally striped within, and the left having a tooth-like process, whence the name is derived; operculum horny and thin. *Animal*, head distinct, having two tentacula, with eyes at the base; foot short. — 25 species, recent.

These shells are found in most seas; they seem to form a connecting link between the *Trochus* and the next genus, which they much resemble.

81. TURBO. — *Shell* rather turreted, base not flattened; mouth round; lips not united; outer lip thin; an operculum, shelly and solid. *Animal*, head having two pointed tentacula, with eyes at the base; foot short. — 34 species recent, and 4 fossil.

The shells of this genus, if placed upon their mouths, will stand steadily in that position, with the axis very much inclined. They are brought from China, India, Africa, &c. The *Turbo litoreus**, or common periwinkle, is used by mankind as an article of food, and is found on the shores of England in great numbers. In Sweden, where they also abound, they serve to prognosticate the approaching state of the weather; the peasants having observed that whenever the periwinkles ascend the rocks it is a sure sign of a storm being near, as their instinct teaches them to place themselves out of the reach of the dashing of the waves; on the contrary, when they make a descent upon the sand it is an indication of a calm. In hot countries some species are often seen on the trees near the coast, and on the rocks elevated above the surface of the water; they remain stationary on the latter during the hottest

* Férussac has introduced a new genus, of which the *T. litoreus* is a species. He names it *Littorina*. The shells are known from *Turbo* and *Phasianella* by having a horny operculum, and from *Trochus* by having few whorls. The shells are found on the shore, whence the name.

hours, even when it is painful to walk on them from their great heat: they leave the water early in the morning, but return at night. These circumstances prove that, although marine, many species are amphibious. These shells are often highly iridescent; and the mouth in some species, as the *Turbo chrysostomus*, is of a deep and beautiful golden colour.

82. PLANAXIS. — *Shell* small and oval; mouth of an oval shape, and having a half-formed notch; left lip flattened, right lip rayed or slightly toothed in the interior; an operculum. *Animal* supposed to be like that of the *Phasianella.* — There are only 2 species, recent.

These Mollusca are found in India, South America, and the Isle of France, where they abound in great numbers, sometimes almost covering the shores in particular spots; they are often found under stones. The shells are usually transversely grooved on the exterior.*

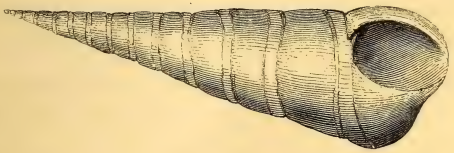
83. PHASIANELLA.—*Shell* oval, solid; mouth

* Some authors remove this genus to a Zoophagous family, but Rang says that the animals resemble the *Phasianella.*

oval, long, not wide; lips disunited at the upper part; right lip sharp, left smooth; the last whorl much larger than the others; a shelly operculum. *Animal*, head having two long and round tentacula, with eyes on two footstalks; foot oblong.—10 species recent, and 2 fossil.

Some species are beautifully coloured, smooth, and shining, and were formerly rare. The greater number have no epidermis. They are found in South America, India, New Holland, the Mediterranean, &c.

84. TURRITELLA.—*Shell* very long, needle-shaped, with numerous whorls, usually trans-



versely striped; no umbilicus; mouth round; lips disunited at the upper part; the right lip has a sinus or indentation about the centre. *Animal* with two tentacula, long and very fine

at the extremity, and having eyes at the base; an operculum.—13 species recent, and 12 fossil.

These shells are found in India, Africa, and Europe; and many of the foreign species attain a large size, some having been found four inches and a half long. They are all marine, more or less striated; but none of the species known possess vertical ribs, thickened bands, or tubercles. The right lip is seldom perfect, and the sinus therefore not always visible.

## Division II.—Zoophaga.

The *Zoophaga*, or carnivorous *Trachelipods*, are divided into five families:—*Canaliferidæ*, *Pteridæ*, *Purpuridæ*, *Columellidæ*, and *Convolutidæ*. They all form the mouth of the shell with a notch or canal at the lower extremity, for the convenience of protruding a retractile trunk, with which they pierce the substance of other shells, and suck out the contents. It is this formation of the mouth which distinguishes the shells from those of the herbivorous members of the order, it being in the

latter entire. The *Zoophaga* are all marine, and all appear to have two tentacula; they are predaceous, as their name implies, and feed for the most part on other shell-fish, either living or in a decayed state.

### Family 11. — *Canaliferidæ.**

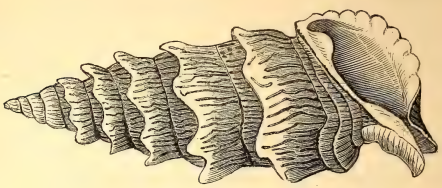
The animals of this family breathe water only; they feed on animal substances by the help of their retractile trunk, and are confined entirely to the sea. The shells are spiral, enclosing the animal, the aperture having a canal either long or short. All have opercula. The family is divided into two parts: in the first the periodical growth of the shell is but slightly marked; in the second it is distinguished by thickened bands or varices, which remain on the external whorls. Seven genera belong to the first division, and four to the last.

#### DIVISION I.

85. Cerithium. — *Shell* turreted, and much elongated; mouth oblong and oblique, having

* *Les Canalifères*, Lamarck.

a short channel at the base, and a notch at the upper part of the right lip; operculum small and



norny. *Animal*, head furnished with a proboscis, and having two tentacula distant from each other, and eyes in the middle; foot short and oval. — 87 species recent, and 60 fossil.*

The Mollusca forming these shells chiefly inhabit the Indian and Pacific Oceans, the Red Sea, &c.; they appear to have the power of remaining for a considerable period out of their natural element, and without food, as has been proved by the following fact: — Two specimens belonging to one of the species of this shell were brought from the Mauritius, and contained the animals, which had drawn themselves far within the shell: they remained in

* Or 220 (Deshayes).

that state during the voyage; but on arriving in England and being placed in sea water, immediately recovered from their inanimate state, apparently uninjured.

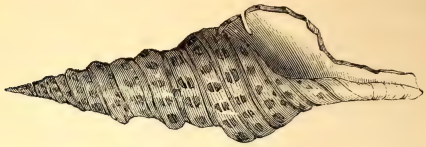
The *Cerithium giganteum* is more than a foot in length, and the only specimen which is in existence is in the cabinet of Lamarck*; it was fished up by an English sailor in the neighbourhood of New Holland, and is, of course, a recent shell. There are fossil specimens of this species, even larger than the recent *giganteum*, found at Grignon near Paris.

The surface of these shells is rarely smooth, being generally covered with spines, prickles, &c., or striped. The regularity of these projecting parts might furnish a sculptor with models for innumerable designs in ornamental architecture. They inhabit the sea; but such as have the canal straight live in salt marshes, or the mouths of rivers.

86. PLEUROTOMA. — *Shell* turreted or fusiform; canal straight and long; right lip having a slit at the upper part, left lip smooth; oper-

* Now that of the Duc de Rivoli.

culum small and horny. *Animal* very little known. —23 species recent, and 30 fossil.



This genus is found in the eastern and tropical seas, many species being abundant at Java. The *Pleurotoma buccinoides* has no canal; but it has a notch, and also possesses the slit in the right lip. *P. gracilis* is found on the British shores.

87. TURBINELLA. — Shell large, heavy, and rather fusiform; spire short; mouth oval, having a long and straight channel; left lip with from three to five distinct plaits, which are at right angles with the axis of the shell; operculum doubtful. *Animal* imperfectly known. —23 species, recent.

Many of these shells are exceedingly heavy. They are found in the Indian and African Oceans. A reversed example of this genus was formerly

in the collection of Lord Tankerville, specimens of which are extremely rare and valuable.

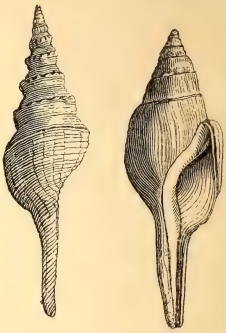
88. CANCELLARIA. — *Shell* oval or turreted; spire slightly elevated, and pointed; mouth oval, having either a very short canal or a notch only; right lip sharp, and wrinkled within; left lip with several irregular plaits; operculum horny. *Animal* doubtful. — 12 species recent, and 7 fossil.

These shells are generally found on the sands of the shores washed by the Indian and African seas, and on the coast of America: they are rare, but not remarkable; and are usually rough to the touch, and striped.

89. FASCIOLARIA. — *Shell* fusiform, and not very thick; spire of a moderate length; mouth oval; canal rather long, sometimes slightly bent; right lip sharp, and often wrinkled inside; left lip having two or three oblique plaits; operculum doubtful. *Animal* unknown. — 8 species, recent.

From the Indian seas, the Antilles, and the Isle of France, and one species from the Mediterranean. They are not numerous, but the *Fasciolaria distans* is very beautiful.

90. Fusus. — *Shell* fusiform or spindle-shaped, the channel and spire being both considerably elongated; left lip smooth; operculum horny. *Animal* unknown. —37 species recent, and 36 fossil.



The localities of this genus are the Indian, Northern, and Atlantic Oceans, the Red Sea, &c. Many of the species are transversely striped, and are covered with an epidermis; on the removal of which they present very beautiful colours. The *Fusus colosseus* is often more than eleven inches long, and other species are five or six.

91. Pyrula.—*Shell* pear or fig-shaped; spire short, and sometimes flattened; mouth oval; left lip smooth; canal straight, sometimes narrow at the extremity, sometimes short and

wide; operculum horny. *Animal* unknown. — 28 species recent, and 6 fossil.

A common and numerous genus, chiefly from the Indian Ocean and Red Sea. The *Pyrula canaliculata* is found in the Northern Ocean; it is a large but light shell, six inches in length. The *Pyrula candelabrum* has the spire quite flat, and if placed upon that part will stand upright; it is very rare. The *Pyrula ficus* very nearly resembles a fig in shape, from whence its name is derived. Some of the species have an umbilicus. In the British Museum is a specimen of a *Pyrula bezoar* that appears to have grown with perfect regularity until the formation of its last half whorl, which is thrown considerably more than half an inch out of its proper position by a group of barnacles. These shells had probably attached themselves to the back of the *Pyrula* at an earlier stage, and as the latter increased in size at length filled the place that should have been occupied by the inner lip, which, on meeting with this interruption, di-

verged from its course, and was thrown over the barnacles. Had the shell not been taken until a later period, there can be little doubt that the animal would have at length destroyed the barnacles, and completely hidden them from view, although it would appear that it had not the power to remove them by absorption while they retained their vitality.*

DIVISION II.

92. STRUTHIOLARIA.—*Shell* oval; spire elevated; mouth oval, terminated by a very short straight canal; right lip thickened, left also thickened and spread out; no varices; operculum horny. *Animal* unknown. —2 species, recent.

These shells are rare and singular; they are in shape like a *Buccinum*, but differ in having a thickened lip: they come from New Holland and New Zealand. Sowerby observes that the thickened aperture appears only to exist in adult specimens of this genus. The usual length of the shell is about two

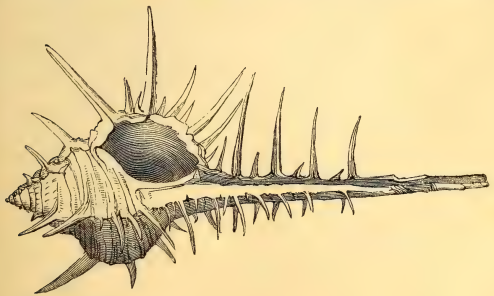
* Gray.

inches, but some writers speak of specimens measuring four inches.

93. RANELLA.—*Shell* oval, rather flattened; canal short; two rows of varices situated at the distance of half a whorl from each other, and longitudinally united, forming a continued ridge on each side of the shell; a sinus or gutter at the upper part of the mouth. *Animal* and operculum unknown.—14 species recent, and 1 fossil.

From the Indian and American Oceans, and the Mediterranean Sea.

94. MUREX. — *Shell* oblong; spire short;



channel generally long, and sometimes closed:

varices three or more, spiny or rough, and connected; mouth round and small; operculum horny. *Animal*, head having two long tentacula furnished with eyes; foot round, and generally short. — 66 species recent, and 15 fossil.

These shells are found in nearly every part of the world, and are remarkably curious: the finest species come from tropical countries. The *Murex tenuispina*, or Venus's Comb, as it is called, is entirely beset with long sharp spines, which the animal has the power of dissolving and replacing by a smooth and even surface, whenever it finds it necessary, in enlarging its shell, to remove them. This faculty is also possessed by other species, but it is very conspicuous in the *tenuispina*. In specimens in which the process is going on, there may be observed a notch formed by this means in the base of the spines, the completion of which eventually causes them to separate from the shell.*

95. TRITON.—*Shell* oblong; canal short; varices placed alternately on each whorl, often considerably distant from each other, and never

* Gray.

longitudinally united; right lip often wrinkled, and left occasionally thickened; operculum horny. *Animal* like the *Murex*. —51 species recent, and 3 fossil.

This genus is found in the Mediterranean, Indian, and South Seas: in many of the countries near which it abounds it is used as an instrument of music. By breaking off the apex, or boring a hole in it, and blowing through the aperture, applied to the mouth of the performer, notes can be produced; and it is employed in this manner by some rude nations as a military horn. The *Triton variegatum* is often met with fifteen inches, or even two feet, in length: it is from the Asiatic seas, and is frequently beautifully coloured.

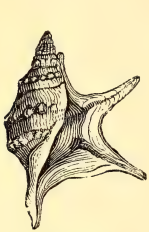
### Family 12.—*Pteridæ*.*

The shells of this family are frequently called Wing-shells, from the circumstance of the last whorl expanding more or less into the form of a wing when the animal has attained maturity;

* *Les Ailées*, Lamarck.

the adult shape of the shell is consequently different from its immature and younger form. There are three genera, all channelled.

96. ROSTELLARIA. — *Shell* rather long, the spire and channel being both elongated; right



lip dilating with age and slightly digitated, one digitation being carried near the apex of the spire and attached to the whorls; sinus near the base; operculum horny, and very small. *Animal* imperfectly known: — 3 species recent, 3 fossil.

These shells are more fusiform or turreted than the other genera of this family; they are found in the seas of China, the Moluccas, and Europe. The *R. rectirostis* is a very rare shell. *R. pes-pelicani* is one of the most common of the

genus, and is found plentifully in the Frith of Forth.

97. PTEROCERAS. — *Shell* oblong; spire small; mouth terminated by a rather long canal; right lip dilated in the adult into several claws, and having a sinus near the canal; operculum horny. *Animal* like the *Strombus*. — 7 species, recent.

The number of claws varies in different species; the *Pteroceras millipeda* has a great many, but they are small; in others they are straight, or nearly so, and smooth; whilst many of them have these appendages very much curved.

There is much singularity in the growth of these shells, and the appearance they present at various periods is strikingly different. In the young state of the animal the shell has no claws, and these gradually make their appearance, at first in the form of short and open canals, which by degrees assume the length and curve of the adult and completed shell, and eventually

are closed up with shelly matter and become solidified.

Nearly all the species are inhabitants of the Indian Ocean, and many of them exhibit the most beautiful colours on their internal surface.

98. STROMBUS. — *Shell* thick and oval; spire moderate; mouth long, and rather narrow, terminated by a canal more or less long and recurved; right lip dilated in the adult, and having a small notch or sinus near the canal; left lip sometimes thickened; operculum horny, long and narrow. *Animal,* head furnished with a proboscis and two tentacula, which are short; the eyes are situated on footstalks longer than the tentacula: foot small. — 32 species recent, and 1 fossil.

These shells are brought from India, Africa, and other hot countries. Many of them attain a large size; and the *Strombus gigas* is used for the purpose of paving the streets at Santa Cruz, and elsewhere. The spire is in many species quite hidden by the expansion of the

outer lip; the latter is sometimes reflected inwards towards the middle part.

The animals of the *Strombus* occasionally produce pearls. Mr. Wood, in his "Zoography," relates that he saw a pink pearl which was taken from the body of the animal of the *Strombus gigas*, which is caught for the table off the island of Barbadoes. The pearl was discovered by chance, whilst the men were employed in cleaning the fish. Its weight was 24 grains; but it would have been more valuable if it had been round. The same author states that only four of these pearls had been discovered in the vast numbers of fish that are annually brought to market in that part of the world, though he has reason to believe that this is in some measure owing to the carelessness of the negroes. This pearl was exactly of the same colour as the interior coat of the shell.*

### Family 13.—*Purpuridæ*.†

This family has the shell either notched at the base, or terminated by a short canal turned

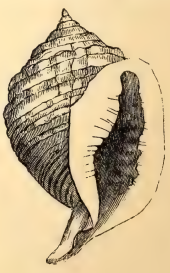
* Penny Cyclopædia, article *Strombidæ*.

† *Les purpurifères*, Lamarck.

towards the back of the shell. Some of the genera have plaits or marks of various kinds on the inner lip; but the form of the shells is different from that of the *Columellidæ* family (which has the lip also plaited, but more distinctly), being much more globular.

The *Purpuridæ* derive their name from the circumstance of some of the genera, especially the *Purpura*, possessing a colouring matter, which was made use of by the Romans to produce their beautiful purple dye; their use has, however, now been discontinued, the cochineal insect having the same effect, and being more readily obtained. There are thirteen genera in this family, and all seem to possess an operculum.

99. CASSIDARIA.—*Shell* rather oblong; spire not much elevated; mouth long, and rather narrow, terminating in a canal, which is recurved, but does not touch the back; left lip often rough or wrinkled, and detached from the pillar; right lip thickened; exterior of shell transversely



grooved, and often spotted with round tubercles; operculum horny. *Animal* like that of the *Cassis.*—5 species recent, and 2 fossil.

These shells chiefly come from the seas of warm latitudes; one or two species are found in European countries.

100. ONISCIA (Sowerby). — *Shell* oblong, rather obtuse; spire short, base rather pointed; mouth longitudinal; canal very short; outer lip thickened, toothed within; inner lip expanded and covered with raised spots; outside ribbed. *Animal* not known. — 3 species recent, and 1 fossil.

It is litoral in its habits, and is found in sand in the South Seas.

101. CASSIS.— *Shell* large and heavy; spire short; mouth either long and narrow, or rather oval, terminated by a short canal abruptly curved towards the back of the shell; both lips generally toothed and flattened; operculum horny. *Animal,* head large, with a very short proboscis, and two tentacula

with eyes in the middle; foot large.—25 species recent, and 1 fossil.

These animals sometimes grow to a very large size, requiring of course a corresponding magnitude of shell. They are chiefly brought from the Indian seas, but a few species are found in the Mediterranean; they live at some distance from the shore on the sand, into which they occasionally burrow, and entirely hide themselves. In some species the columellar lip projects above the spire, giving a flat appearance to the lower part of the shell.

The shells of the *Cassis rufa* and other species are exquisitely sculptured by Italian artists in imitation of antique cameos, the different strata of colouring matter resembling those of the onyx and other precious stones. Of these a great variety of ornaments are made, and of late years a considerable trade has been carried on in them on the Continent. The substance of shells seems to be formed of three plates, the central generally being the thickest, and the outer one the thinnest. The Italian cameo cutters appear to be aware of this circumstance, and avail themselves of it in cutting the

cameos, the ground being always formed of the innermost layer of the three, which is also generally the most transparent.*

102. RICINULA. — *Shell* oval, generally covered externally with spines; mouth notched and narrow, strongly toothed on each lip, by which the aperture is contracted; spire very short; operculum horny. *Animal*, head large; proboscis short; two tentacula with eyes in the middle; foot rather large. — 9 species, recent.

These shells are usually small, and when young have no traces of teeth: they are all natives of foreign countries, and are found principally in the Indian seas on coral reefs and rocks. The *Ricinula horrida* is a remarkable species, being whitish, and covered with black pointed knobs; the mouth is full of teeth, and is tinged with a violet colour.

103. PURPURA. — *Shell* oval, thick, either smooth or tuberculated; spire short; mouth large and notched; left lip flattened; operculum

* Gray, Philosophical Trans.

horny. *Animal,* head large; proboscis either short or altogether wanting; two tentacula, having eyes in the middle; foot large. — 50 species, 1 of which is also fossil.

The *Purpura* is found most abundantly in warm seas, where the shells attain the largest size, a few only of the species being met with in Europe; they are chiefly litoral, or found on and near the sea coast. It was from the animal of this genus that the Roman purple dye was obtained. *P. patula* is supposed to be the species; it is found in the Atlantic Ocean and Mediterranean Sea. The species *P. lapillus,* found on the British coasts, affords a small quantity of this colouring matter.

104. Monoceras. — *Shell* oval; mouth rather long and notched; a sharp projecting tooth at the base of the right lip; left lip generally flattened. *Animal* like the *Purpura.* — 5 species, recent.

Found in the seas of southern

latitudes, particularly those of America; like the last genus they frequent the rocks.

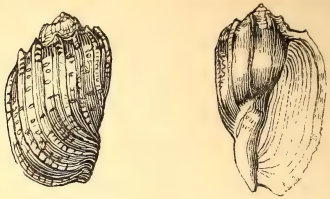
105. Concholepas. — *Shell* thick and rough; apex inclined towards the left lip; mouth very large, with a slight notch at the base; right lip having two teeth at the base; an operculum.

*Animal* like the *Purpura.* — Only 1 species, recent.

Of this singular genus the only species known is very abundant on the coasts of Peru and Chili, and is known by the name of *Concholepas Peruvianus.* It often grows to a large size, and although not beautiful is a curious shell. In its shape it has more analogy with the *Patella* family than any other; but from the different form of the animal, and the circumstance of its constructing a large operculum, it must be placed amongst the *Purpuridæ.* The shell is two or three inches in length.

106. Harpa. — *Shell* oval, smooth, and marked with parallel longitudinal ribs, the up-

per end of each of which, near the sutures, is projecting and pointed; spire short, last whorl large and deeply notched; outer lip thickened:



it is supposed to have no operculum. *Animal*, head large; mouth open below; destitute of a proboscis; but having two tentacula, with eyes in the middle; foot large.—8 species recent, and 1 fossil.

The principal localities of this genus are the Red Sea and the Indian and South American Oceans. The *Harpa imperialis*, from the Mauritius, is a remarkably beautiful shell, and exceedingly rare: at one time it could only be procured at an extravagant price, but now it is more common. It is distinguished by the very great number of ribs, which, indeed, are almost close together; and the colours and markings are very elegant and beautiful. There is a fishery for them at the Mauritius and the

neighbouring islands, and they are taken at night and at sunrise, when they are probably feeding. Some naturalists * affirm that the animal can, when attacked by an enemy, disembarrass itself of part of its foot, and retire entirely within its shell. The ribs in this genus are evidently the remains of what has been the mouth of the shell at different periods. The *H. ventricosa* is the most common species of this genus, and perhaps the most beautiful.

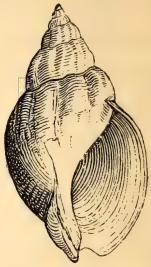
107. DOLIUM. — *Shell* large, light, globular; mouth wide and notched, generally transversely banded, and the right lip in consequence waved; operculum horny. *Animal,* head large, having a short proboscis, and two tentacula with eyes in the middle; foot rather large. — 7 species, recent.

These shells are found, for the most part, in the seas of the Indies, Africa, and South America: one species, however, the *Dolium galea,* is met with in the Mediterranean. They are

* MM. Quoy and Gaimard, and M. Reynaud.

often found on reefs, and sometimes attain a very large size, specimens having been seen as large as a man's head; even, then, however, they retain the fragility and thinness of texture which characterise most of the species.

108. BUCCINUM.—*Shell* rather oval; spire and mouth equal in length; inner lip not flat, but swollen at the upper part; mouth notched; shell slightly covered by an epidermis; operculum horny. *Animal*, head furnished with a proboscis, and two tentacula having eyes in the middle; foot short.—140 species recent, 5 fossil.



These shells are found in all parts of the world*; and in many places, particularly in northern countries, the animals of the *Buccinum undatum* (under the name of *whelks*) form an article of food. The shells are not remarkable for brilliant colours; but their great diversity of form, delicacy of sculpture, and pencilled

* Captain Parry found two species, *B. glaciale* and *B. Sabinii*, within the arctic circle.

markings, render them interesting. They never attain a large size, and the greater number are litoral shells. They are sometimes sinistral.

109. NASSA. — *Shell* globular or oval, according to the spire, which is sometimes short, sometimes rather long; mouth oblong, notched; inner lip thickened, and spread out, occasionally very large; right lip often wrinkled; operculum horny. *Animal,* head large; proboscis short, or altogether wanting; two tentacula, with eyes in the middle; foot very large. — 9 species recent, and 2 fossil.

They abound in the South of Europe and the East Indies; and some are also found on our coasts. They are occasionally seen on the sand or reefs, feeding on the *Mactra,* which they effect by piercing the shell with their proboscis, making an extremely regular round hole, and extracting the contents through the aperture thus formed.

110. EBURNA. — *Shell* oval, smooth; mouth oblong and notched; left lip thickened, right thin; operculum horny; and an umbilicus. *Ani-*

*mal,* head furnished with a proboscis, and two tentacula having eyes in the middle; foot short. — 5 species, recent.

The shells of this genus are found in the Indian and Chinese seas. The *Eburna Zeylanica* is remarkable for the little spines with which the umbilicus is filled, and this peculiarity distinguishes it from the other species which are destitute of them. The *Eburna glabrata* very closely resembles the *Ancillaria**, in having the spire exceedingly smooth, and the sutures not in the least channelled; it differs, however, in having an umbilicus.

111. Terebra. — *Shell* long, turreted, and slender; spire pointed; whorls often strongly marked at the upper part, resembling a double suture; mouth oval and strongly notched; no epidermis nor operculum. *Animal,* head not furnished with a proboscis, but fringed, and having two tentacula with eyes at the base; foot oval. — 24 species recent, 2 fossil.

* It is now placed in that genus.

These shells are often called Needle-shells, on account of their sharp, lengthened, and spiral form; and although by no means rare, are often elegantly marked. Some of them exceed ten inches in length. The notched mouth distinguishes them from the *Turritella*, which they much resemble in shape. Very few of the species are European, the greater number inhabiting the warmer latitudes of the East and West Indies and Africa. They occasionally creep out of the water, still keeping, however, within reach of the spray.

### Family 14.—*Columellidæ.**

The shells composing this family have no canal at the base of the aperture, but a notch, more or less distinct, and plaits on the columella or left lip. The beauty of many individuals of this family makes it interesting. There are five genera.

112. Columbella.—*Shell* oval; spire short; plaits small; right lip thickened, turned inwards, and swollen in the middle; shell often

* *Les Columellaires*, Lamarck

transversely striated, and much varied in colour; operculum small and horny. *Animal*, head having two tentacula, with eyes near the base. —18 species, recent.

Inhabits both the Atlantic and Pacific, in warm latitudes. The *C. rustica* is also found on the southern coast of Italy.

113. MITRA. — *Shell* turreted, rather fusiform; spire pointed at the end; the lowest plaits on the inner lip are the smallest; outer lip sometimes toothed; operculum doubtful.* *Animal* not much known; the trunk, however, is very long, and the foot small. — 80 species recent, and 14 fossil.

These shells are much smaller and more slender than the *Volutes* (the next genus), but are not inferior to them in beauty of sculpturing and colour. They exhibit an infinite variety of patterns; sometimes grooved, sometimes

* Existing in some species, not in others.— *Gray.*

smooth, and variegated with every kind of hue. They abound in the seas of hot climates, the greater number inhabiting the Pacific Ocean, where they are met with chiefly in shallow water, near coral reefs; others, however, are found at great depths. The animal has been supposed to be of a poisonous nature, and to wound, with its pointed trunk, those who touch it.

114. VOLUTA. — *Shell* oval, thick, generally tuberculated; spire short or conical; aperture generally angulated and large; outer lip thickened within; the lowest plaits on the inner lip, or those which are nearest the notch, are the largest; no operculum.* *Animal*, head distinct, having two short triangular tentacula, with eyes at the base, and a long thick proboscis or trunk; foot very large. — There are 44 species recent, and 18 fossil.†

* Except *Voluta musica*, which has one of moderate size. — *Gray.*

† This number includes the species of the next two genera, as described by Lamarck.

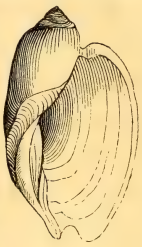
This genus, as constituted by Lamarck, contains some of the most beautiful shells that are known: they are generally smooth, shining, and the colours bright and varied; and differ exceedingly in form and size, some being globular, others oval, some turreted, and others with only a very small spire. Some of them have spines at the upper part of each whorl, which form a kind of thorny crown; many are curiously marked with lines and spots, so as to form some resemblance to a line of printed music; and one very scarce species is marked with five or six transverse milk-white bands upon a dark ground, and spotted with reddish brown, forming a beautiful contrast of colours.

The *Volutes* are found principally in hot climates, none having been discovered in European seas, and but few in America. They often attain a very large size; but the fossil species are generally smaller than the recent. The most rare species is *V. Junonia.* Very few examples of it are known, not perhaps more than four. It is of a yellowish white, and covered with a multitude of red-brown spots; some round, others

almost square, and disposed in transverse rows near one another.

Mr. Broderip has separated some shells from the genus *Voluta* under the names of *Melo* and *Cymba*. Their generic distinctions will be understood by the following descriptions.

115. Melo (Broderip).—*Shell* light, ventricose, oval, with a light greenish-brown epidermis; spire short, regular, sometimes hidden by the last whorl; aperture large, nearly as long as the whole shell; outer lip thin; columella slightly curved, with four or five oblique prominent plaits.



The aperture of this shell is much larger than that of *Voluta*, and the shell and outer lip are thinner. They are very beautiful, and of a large size.

116. Cymba (Broderip). — *Shell* smooth, ventricose, with a short rounded spire; a very large wide aperture, terminating at the upper part in a flat ledge, which separates the outer lip from the body whorl; columella with three or four oblique projecting folds, ter-

minating in a point; outer lip thin, with its spiral edge sharp; epidermis smooth, brown, covered partly or entirely by the glassy enamel, which, commencing with the outer lip, spreads over the body of the shell.

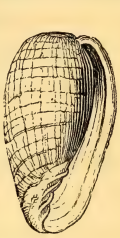
These shells are found in Africa, and are distinguished by the rude ill-shapen spire, and the curious ledge which separates the outer lip from the body whorl.

117. MARGINELLA. — *Shell* oval, smooth; spire short; right lip having a thick margin; plaits nearly equal in size; no operculum. *Animal*, head very distinct, with a small proboscis, and two tentacula having eyes at the base; foot very large. — 22 species recent, and 3 fossil.

These shells are often very beautifully coloured; many have the spire exceedingly short. They inhabit hot climates. The inhabitant is supposed to cover its shell with its mantle, depositing successive layers of shelly matter, as

the examples of this genus differ materially in thickness of substance.

118. VOLVARIA. — *Shell* oval; spire scarcely visible; mouth narrow, and as long as the shell; plaits few, at the lower part of the inner lip; outer lip thin, or only slightly thickened. *Animal* unknown. — 5 species recent, and 1 fossil.



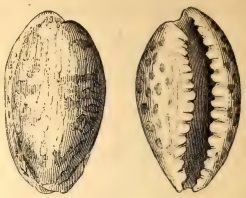
These shells are found on the coasts of Africa and China, where the natives string them into necklaces.

## FAMILY 15. — *Convolutidæ.**

Shell without a canal, but having the base notched; the whorls of the spire large, rolled round each other, so that the last nearly, and in some instances entirely, conceals all the others, rendering the aperture long and narrow; the body of the animal is therefore very flat. The three first genera of this family have the right lip recurved inwardly in the adult. They do not possess an operculum. There are seven genera.

* *Les Enroulées*, Lamarck.

119. CYPRÆA.—*Shell* oval, convex; mouth linear, notched at both ends, thickened and toothed on each side in the adult shell; spire sometimes entirely hidden. *Animal*, head distinct, furnished with two tentacula, having eyes at the base on small projections; mantle and foot very large.—There are 68 species recent, and 18 fossil.



These shells are remarkable for the different appearance they present during the several stages of their growth. Whilst young they are very thin, almost colourless, and dull on the outside; the mouth is rather wide, the outer lip not rolled inwards, but having a sharp edge. At a more advanced period the lips are curved inwards; but the shell is still thin, and the colours not bright.* At a later stage, when

* The gradations of advancing growth may be easily remarked in the common *C. Mauritiana*.

it has attained its full growth, the outer lip is thickened and rolled inwards, the back marked with the most beautiful patterns, and bearing an exquisite polish, and the spire, at the same time, if not entirely hidden, scarcely projects. The animal itself undergoes a considerable change in appearance during its growth. Its mantle is at first small, but increases with the enlargement of the shell, and expands at its sides into two large wings; from these is deposited the final layer of shelly matter which forms the exterior coating, and which is caused by the animal enveloping the shell entirely in its mantle. At the point where the two expansions of the latter meet on the back of the shell a line is consequently formed, which is called the dorsal line; but occasionally these lobes are so much extended as not only to meet, but to wrap over each other, in which case there is no line.

This shell is generally found in the seas of hot climates, the Indian Ocean, and the seas of Africa and America. A few species are met with in temperate regions; but they possess no

great beauty, neither attaining the vivid tints nor the delicate markings of those more favoured in situation. The *Cypræa Europea*, or Nun Cowrie, is found in abundance on our own coasts.

When at rest the *Cypræa* remains buried under the sand, at the bottom of the sea, at a short distance from the shore; it occasionally traverses the rocks and coast, and may be found under stones and corals.

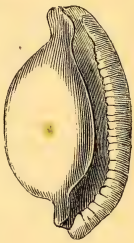
The *Cypræa moneta*, or Money Cowrie, is the current coin of Siam, Bengal, and Africa: it is collected in the latter by the negro women, and sent into different countries. In Bengal 3200 are reckoned to be equivalent to a rupee, or about two shillings of English money. In the Friendly Islands permission to wear the *Cypræa aurantia*, or Orange Cowrie, as an ornament, is only granted to persons of the highest rank.

The *C. aurora* is considered the most rare of this genus. The New Zealanders suspend it to their dress as an ornament, and it is therefore frequently found with an artificial perforation. *C. cervina* is supposed to be the

largest species, being more than four inches in length. It inhabits the American seas.

120. ERATO (Risso). — *Shell*, spire conical; apex rather round, blunt; shell, when young, smooth; the adult with both lips finely marked with lines; columella concave, plaited or smooth. A groove down the back of the shell. *Animal* like that of *Cypræa*. From the Pacific Ocean.

121. OVULA. — *Shell* oblong; inner lip without teeth; outer slightly toothed or wrinkled, the extremities generally projecting; spire quite hidden. *Animal* very similar to that of the *Cypræa;* the mantle, however, has only one lobe, which folds over the left lip. — 12 species recent, and 2 fossil.

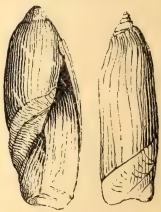


In some species the ends of the mouth are so much lengthened as to make the shell fusiform or spindle-shaped. The *Ovula oviformis* is perfectly white outside, and of an orange brown within; the young shell is as thin as paper.

This genus chiefly inhabits the Indian and Chinese seas; it is also found in the Black Sea and the Mediterranean.

122. TEREBELLUM. — *Shell* oblong, smooth, and convolute; spire pointed; sutures not channelled; mouth narrow and long; right lip rather sharp, left lip quite smooth. *Animal* unknown. —1 species recent, and 2 fossil.

These shells are brought from the Indian seas; they are thin, delicate, and prettily marked with bands and cloudy spots.

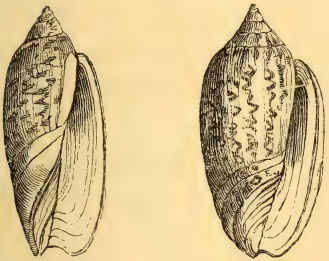


123. ANCILLARIA. — *Shell* oblong and very smooth; spire pointed; sutures not channelled, but nearly effaced; mouth wide and long; right lip sharp; left lip having the base thickened, with a shelly ridge. *Animal* almost unknown; the foot, however, is very large. —4 species recent, and 5 fossil.

This genus is chiefly confined to tropical climates; the shells are smooth, and highly polished, presenting a surface infinitely more even than if produced by artificial means: some

of them have a small tooth at the lower part of the right lip. When the animal is alive, the shell is covered so much by the foot that only the middle of the back can be seen. The *Ancillaria cinnamonea* is exceedingly scarce.

124. Oliva. — *Shell* oblong, smooth, and convolute; spire short; sutures channelled or



grooved; mouth narrow and long; right lip rather sharp; left lip thickened at the top, and striated; operculum horny and small in some species, in others not existing.* *Animal*, head small, terminated by a proboscis; two tentacula enlarged at the base, and having the eyes si-

* Gray.

tuated in the middle; foot very large; mantle large, covering great part of the shell. — There are 62 species recent, and 5 fossil.

These shells are very common, and are often very beautiful; many attain a large size. They are brought principally from Asia, but are also found in the African and American seas.

125. CONUS. — *Shell* shaped like a cone, the spire forming the base, and scarcely projecting; mouth narrow and long; left lip smooth; operculum very small and horny*; usually an epidermis. *Animal,* head very distinct, terminated by a trunk capable of being greatly extended; two tentacula, with eyes near the summit; foot oval, and rather long. — 181 species recent, and 9 fossil.

Many of the species of this genus are marked

* Adanson.

with the most beautiful and extraordinary figures, some of them resembling Hebrew, Greek, or Arabic characters, and bearing a most exquisite polish; in other varieties the colours are arranged in almost endless shapes, being clouded, veined, marbled, dotted, striped, and banded, in every kind of form. Many of them are very rare, and a specimen of the *Conus gloria maris* has been sold for as much as one hundred guineas.*

In some of the species the spire presents the appearance of having been pushed into the body of the shell, the apex being below the level of the outer whorl; a spire of this kind is called *retuse.*

When a section is made of a cone, it will appear that the sides of the internal whorls are much thinner than those of the external; it is supposed that this arises from the animal re-

* The famous *Conus cedo-nulli*, formerly in the cabinet of Lyonnet, at the Hague, is said to have been sold for three hundred guineas. There are very few specimens existing. Lamarck's specimen was considered by him the most precious in his collection.

ducing the thickness of these internal walls by absorption, either for the purpose of giving itself more room, or in order to diminish the weight of the shell.

They are found abundantly in all tropical countries, particularly in Asia, but become more rare as they approach the northern hemisphere; a few species only are found in the Mediterranean.

## Order IV.

### CEPHALOPODA.*

There is much difficulty attending the classification of this order, which derives its name from the position of the animal's apparatus for moving; it possesses for that purpose a circle of eight, ten, or more fleshy processes, which may be indifferently called arms, legs, or tentacula. These appendages are attached to the head of the animal, which is also furnished

* *Les Céphalopodes*, Lamarck.

with a mouth terminating in two strong mandibles, similar to the beak of a parrot; it likewise possesses a perceptible organ of hearing, and two large eyes, immoveable, and without eyelids.

The animals may be separated into three divisions, — *Polythalama*, in which the shell is chambered or divided into numerous cells; *Monothalama*, in which the shell has only one chamber, destitute of partitions; and a third, in which there is no shell whatever.

The mantle of the *Cephalopoda* is in the form of a bag, and covers the lower part of the body. Most of the recent species live at great depths in the sea, and are found nearly all over the world. Some swim, and attach themselves to marine bodies; others creep on the sand, by the aid of their tentacula, and often retire into holes in the rocks. They are all *zoophagous*, living on crabs and other animals, which they seize and devour.

The following is a list of the genera which Lamarck has introduced into this order: —

1. Belemnites.
2. Orthoceras.
*3. Nodosaria.
4. Hippurites.

5. Conilites.
6. Spirula.
*7. Spirolina.
*8. Lituola.
*9. Renulina.
*10. Cristellaria.
*11. Orbiculina.
*12. Miliola.
13. Gyrogona.
*14. Melonia.
*15. Rotalia.
*16. Lenticulina.
*17. Placentula.
*18. Discorbis.
*19. Siderolites.
*20. Polystomella.
*21. Vorticialis.
22. Nummulites.
23. Nautilus.
24. Ammonites.
25. Orbulites.
26. Ammonoceras.
27. Turrilites.
28. Baculites.
29. Argonauta.
30. Octopus.
31. Loligopsis.
32. Loligo.
33. Sepia.

Those genera which are marked thus * are now removed from the *Cephalopoda*, having been proved to differ from molluscous animals by Dujardin, and by him are placed in a distinct class. He says they are inferior in their organization to the *Radiata*, and endowed with locomotive power by the instrumentality of minute tentacular filaments. Ehrenburg makes them belong to the second great division (*Bryozoa*) of his coral animals.

No. 4. in the list proves to be a Bivalve, not unlike a *Chama*. No. 13. is the seed of the *Chara*. Nos. 5. 25. 26. are doubtful genera.

Of those left, *Spirula*, *Nautilus*, and *Argonauta* are perhaps the most interesting to the young conchologist, and will therefore be fully described. The remainder are nearly all fossils. Some of the generic names have been changed by modern naturalists; but as there is much uncertainty respecting them, they will only be described in a cursory manner.

## Division I. — Polythalama.*

126. Belemnites. — *Shell* straight, in the shape of a long cone; external part a sheath

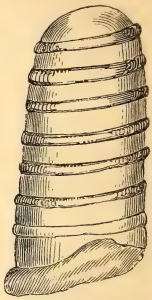
having a conical cavity in the upper part, and containing an inner cone, which is chambered and perforated. — 2 species described.

These shells are only found in a fossil state, and are very common, having been met with in all ages and countries, and having given rise to much speculation as to their real character. It

* *Les Céphalopodes-polythalames*, Lamarck.

is but recently that their true origin has been discovered, and their place in creation ascertained; in former ages they have been described as petrified fingers, thunder-stones, stalactites, or as the teeth of an animal.— There are nearly 100 species at present known.

127. ORTHOCERAS. — *Shell* straight, with septa regularly concave towards the mouth, perforated by a simple and nearly cylindrical siphuncle, either in or not far removed from the centre of the disk.



All fossil? Found in strata mostly below the carboniferous or mountain limestone.

128. SPIRULA. — *Shell* cylindrical, thin, and almost transparent; partially spiral, the whorls not touching each other; perforation of the chambers at the side, which are equidistant; partitions externally concave. *Animal* with ten arms, two of which are longer than the others, and nearly conceal the shell. — 1 species, recent.

This shell, which is very curious, and not uncommon, is found in the Eastern Ocean. It is thin and fragile, and of a pearly white. The only species known is *S. Peronii.*

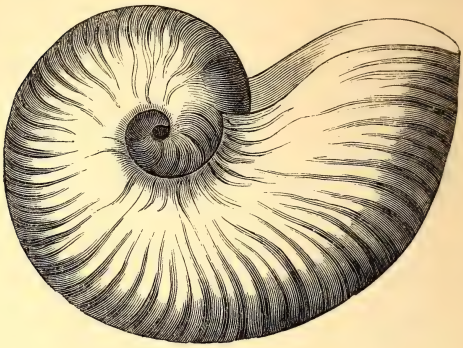
129. NUMMULITES.—*Shell* thin towards the margin; spire internal, discoid; whorls contiguous, and not apparent; cells numerous and small; partitions transverse, and not perforated. —4 species.

These shells are all fossil, and exist in immense numbers; they are very flat, and take their name from their resemblance to pieces of money. In many parts of the world they are accumulated in such vast masses as to form entire mountains, and many buildings have been constructed of limestone crowded with them. They vary in size from more than an inch in diameter to great minuteness.

130. NAUTILUS.—*Shell,* whorls contiguous, the last enveloping the others; chambers numerous, formed by transverse partitions, and perforated by a tube. *Animal* having numerous tentacula, and attached to the shell by two

muscles.—2 species recent, 1 of which is also found fossil.

This shell and its remarkable inhabitant are



found in the seas of warm latitudes, especially those of Africa, Asia with its islands, and Australia. They usually remain at the bottom of the water, and are able to creep along rather quickly, supporting themselves upon their tentacula, with the head downwards, and the shell raised above; they often get into the fishermen's nets when thus moving about at the bottom of the sea. After stormy weather, as it becomes more calm they may be observed,

in great numbers, floating upon the surface of the waves, with the head put out, and the tentacula resting upon the water, the shell at the same time being undermost; they do not, in a general way, remain long sailing in this manner, and have the power of easily returning to their situation at the bottom of the sea, by merely drawing in their tentacula and upsetting the shell, which immediately sinks with them. It was only in 1829 that this animal was known with any certainty, one having been caught alive, by Mr. G. Bennett, near the New Hebrides Islands; the animal, after drawings were made of it, was preserved in spirits, and is now in the museum of the College of Surgeons.

The ancients fabricated drinking-cups of the shell of the *Nautilus pompilius;* the other species, the *Umbilicatus*, is very rare, and is distinguished by a large umbilicus on each side: the former is often found in a fossil state.

131. AMMONITES.*—*Shell* discoid, spiral;

* This genus has been divided into three; *Ammonites*, *Goniatites*, and *Clymenia*.

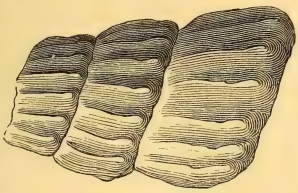
whorls contiguous, and all apparent; inner surface (the exterior covering has generally disappeared) marked by the sinuous partitions, which are transverse, and lobed or cut, but not perforated; last chamber occupying the whole of the last whorl of the spire. — Between 200 and 300 species.

These shells are all fossil, and are occasionally two feet or more in diameter.* They occur in Europe, Asia, and America. Dr. Gerard found them in the Himalaya mountains, an elevation of 16,000 feet; M. Ménard met with one in the Maritime Alps. Their numbers must have been very great, as M. Dufresne informed Lamarck that the road from Auxerre to Avalon, in Burgundy, was absolutely paved with them; and it is no uncommon occurrence to find them used in some parts of Somersetshire, Gloucestershire, and Yorkshire, to pave the roads.

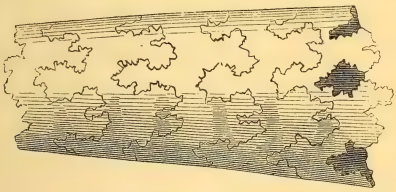
132. TURRILITES. — *Shell* spiral, turreted;

* Dr. Buckland speaks of some found in the chalk near Margate which exceeded four feet in diameter.

whorls contiguous and apparent; partitions sinuous; mouth round. — 1 species, fossil.



133. BACULITES. — *Shell* straight, cylindrical, sometimes slightly compressed, and



somewhat conical; partitions sinuous, transverse, a little distant. — 3 species.

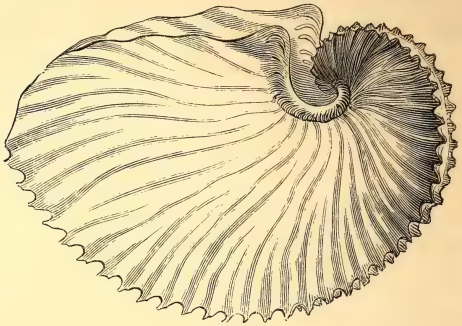
All fossil; abundant in the limestone of Valognes in Normandy.

## DIVISION II. — MONOTHALAMA.*

134. ARGONAUTA. — *Shell* monothalamous, symmetrical, external, and containing, (but not

* *Monothalames*, Lamarck.

attached to,) the body of the animal; spire bicarinated, tubercled, and curved back into the



mouth. *Animal* having eight tentacula; two of which are thin and dilated, and are often called the sails. — 3 species, recent.

These curious and beautiful shells are found in the seas of warm latitudes, and are both pelagic and litoral.* They are commonly called the Paper Nautilus.

An interesting series of experiments was made a few years ago by Madame Power, for the purpose of ascertaining the nature and habits of the *Argonauta*, about which much contro-

* Penny Cyclopædia, art. *Paper Nautilus.*

versy had existed. She constructed a kind of cage in the sea, near the coast of Messina, and enclosed in it several of the living animals, which she kept supplied with their natural food, consisting of small molluscs. The result of her observations went to prove that the animal is in the habit of floating, or rather sailing, on the surface of the water, using its dilated tentacula as sails, the remainder as oars, and aiding its movements by means of a kind of proboscis which it employs as a helm: the animal is not attached to the shell, but, when under water, it adheres firmly to it by its sail-arms, which are turned over and affixed to the outside, entirely covering it. The shell, which is remarkably brittle when exposed to the air, is perfectly pliable in water, and is thus enabled to escape the destruction which would otherwise appear likely to be met with by so thin and tender a fabric.

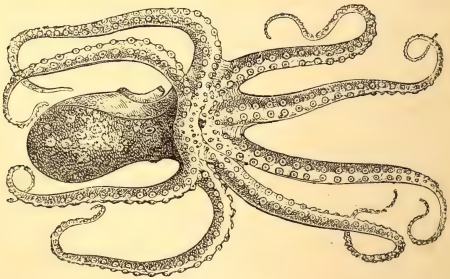
The animal of the *Argonauta*, during life, and when unconscious of being observed, is very beautiful, the sails and other visible parts presenting the most lively colours — purple, gold, and silver. At the approach of any object, it

takes in its tentacula, wraps its sails over the shell, and descends, blackening the water at the same time, if hard pressed, by a discharge of ink, to cover its escape. During the experiments referred to, the animals seemed very shy, and would descend to the bottom on the approach of any person; except when hungry, at which time they would take food from the hands of Madame Power.

### Division III. — *No external shell.*

The four following genera do not form an external shell, and will not therefore be particularly described.

135. Octopus. — Has two little cartilaginous pieces in the interior of the body.



It is found in all seas.

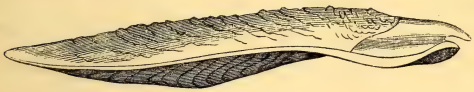
136. LOLIGOPSIS. — Internal support unknown. The tentacula are enormously long.

137. LOLIGO. — *Shell* thin, transparent,

sometimes partially gelatinous, of variable form, but generally shaped like a pen.

Common on our coasts.

138. SEPIA. — *Shell* calcareous, oval, thick,



concave on both sides, terminated posteriorly by a point.

Brought principally from India, though found on our coast and the Mediterranean. Mr. F. D. Bennet states that the cuttle fish is considered a luxury by all classes of the Sandwich Islanders, and that when fresh and well cooked it is excellent, being in consistence and flavour not unlike the flesh of a lobster's claw.*

There are some very extraordinary accounts

* Narrative of a Whaling Voyage round the World.

given of the supposed size and power of these mollusca by De Montford, in Buffon's Histoire Naturelle, but, though exceedingly amusing, their accuracy is now doubtful. Some are described as large enough to draw down men-of-war at sea, and completely destroy them. But this is an exaggeration no doubt, though there are some species that grow to a very large size. Mr. Swainson remarks in his *Malacology* that he saw many caught on the shores of Sicily, and that two would be a heavy load, their arms being as thick as those of a man.

## ORDER V.

### HETEROPODA.

In this tribe, the foot is formed into a kind of fin, by the aid of which the animal moves; there are only four genera, *Carinaria*, *Atlanta*, *Pterotrachea*, and *Phylliröe*, and of these the two former alone possess shells, and need a particular description.

139. CARINARIA (*Cuvier*). — *Shell*, conical, flat at the sides, transparent, and having the apex recurved. *Animal*, body long, gelatinous,

possessing one or more fins; the head can be contracted within the body, and is provided with two tentacula, two eyes, and a retractile proboscis. — 3 species recent.

There are only three species known of this singular genus. The *Carinaria vitrea* is so called from its resemblance in substance to glass, and is found in the African seas: it is very rare. The *Carinaria fragilis* is extremely delicate in its texture, and inhabits the Mediterranean; and the *Carinaria cymbium*, or *boat-shaped*, which is not larger than a grain of sand, and can only be seen with the assistance of a microscope, is brought from the Eastern Ocean and Mediterranean Sea; it is found on the coast near Nice, and feeds on small *Medusæ* and other gelatinous substances, as also on minute fish, and occasionally the more feeble of its own species.

The mollusca which form these shells are very transparent, but are possessed of lively and brilliant colours; they only appear on the surface of the sea during calms. The shells are comparatively small, as they only cover the circulating and respiratory organs; they were

formerly very rare (specimens having been sold for one hundred guineas), but are now more common: they are seldom perfect.

140. ATLANTA. — *Shell,* somewhat resembling the *Carinaria,* but having the apex spirally whorled; transparent, and large enough to contain the animal entirely: a thin and glassy operculum.

*Animal,* head having two tentacula, and large eyes at the base; foot or fin large. — 2 species recent.

This genus is found in all the seas of hot climates.

141. PTEROTRACHEA.
142. PHYLLIRÖE. } No shell.

In these two genera, the animal resembles the *Carinaria* in the position of the heart and gills; they are both found in the Mediterranean, and, owing to their extraordinary transparency, it is very difficult to perceive them when in the water. The *Pterotrachea* has four species, the *Phylliröe* only one.

Having brought this elementary work to a conclusion, it must be added, that the greater advance the reader makes in the study of Conchology, the more he will find to interest and delight him. The beauty of form in some shells, the grotesque shapes of others, the exquisite colouring and marking of many, and the habits and peculiarities of the inhabitants of all, will excite wonder and admiration at the care which has been bestowed on creatures, of which thousands are never seen by the eye of man. He will be led to reflect that they were formed by Him who has made nothing in vain, and that these, among the many exquisite productions of Nature, were created "for man to gaze on, wonder, and adore."

# GUIDE

TO

# THE USE OF THE TABLES.

THE young student will soon ascertain the generic name of any shell by adhering to the following method: — We will suppose an *oyster* to be a shell under examination. At one glance it will be found to be a Bivalve. The first table must, therefore, be consulted, which is found to be divided into three orders, each of which must be examined. The first has no ligament, but a pedicle to attach the shell to other substances. The oyster having a ligament (if the specimen be perfect), the description of the next order must be looked at; but the two muscular impressions at once determine that the oyster does not belong to it. The specimen, therefore, must be placed amongst the Monomyaria, which is divided into two parts: the first has the ligament lengthened, which is not the case with the oyster, for it is thick and short. It may, therefore, be concluded that the shell belongs to the second division, and to one of its two families. The Pectenidæ are distinguished by the shells being solid, eared, and often ribbed. The oyster does not resemble this description, and therefore must be of the Ostreidæ family, for it is foliaceous. When the family is ascertained, the generic name is found by turning to the description of the former in the body of the work; and the account of each genus, with the assistance of the drawing, will enable the student to determine that the

shell is an Ostrea. The next class (the Univalves) may be treated in the same way. A *whelk*, a shell common on our coasts, belongs to this class. The second table must be consulted. There are five orders, which must each be examined. The shell in question cannot be of the Order Pteropoda, because it is neither cartilaginous nor horny. It cannot belong to Gasteropoda, because it is not cup-shaped nor slightly rolled up. It may belong to Trachelipoda, because it is spiral. In the first division of that order the aperture is entire, which that of the *whelk* is not. The second division has the aperture with a canal or notch : this agrees with the specimen in hand. Each family of that division must now be examined. It cannot belong to Canaliferidæ, because it has not a canal, nor the right lip thickened. The Pteridæ have the right lip greatly dilated or lobed : that family may therefore be passed over. The Purpuridæ have a short canal turned back, or a notch, and the form of the shell is globular. The whelk is notched, and its form is rather round ; and as it could not belong to the other two remaining families, we may suppose it is one of the Purpuridæ. The genus is next found by consulting the account of that family in the work, and it will be with ease ascertained that the whelk is a *Buccinum*. By affixing a number to the specimen, corresponding to that in the book, it may be referred to at any time to refresh the memory.

The Annulata and Cirrhipeda have not been included in the tables, as their names are more easily ascertained than those of the other classes, from there being few genera, and their general form and appearance being very different.

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# EXPLANATION OF TERMS.

*Acephalous.* Mollusca without an apparent head; comprehending the Bivalves of conchologists.

*Acuminated.* Ending in a graduated, and often acute, point.

*Adductor Muscle.* That which closes the two pieces of a Bivalve together, the base or insertion of which is indicated by an irregular depression in each valve, these being called the muscular impressions. (See *Muscular Impressions.*)

*Annulated.* Marked with rings.

*Anterior.* The side of the shell, in Bivalves, where the ligament is situated. (See *Posterior.*)

*Aperture.* The mouth or opening of the shell, in Univalves, from which the head of the animal protrudes.

*Apex.* The commencement or top of the spire in Univalves.

*Articulated.* Jointed.

*Auriculated.* (*Eared.*) A term given to a few Bivalves which have a flat angulated projection on one or both sides of the umbones or bosses: these processes are most developed in the *Pectens.*

*Auriform.* (*Ear-shaped.*) Shaped like an ear; as the *Haliotis.*

*Base.* The extremity opposite to the *Apex*, in Univalves: in such Bivalves as adhere to other substances by one of their valves, as in *Spondylus*, *Anomia*, &c., that valve is termed the *basal.*

*Bicarinated.* Having two elevated or sharp ridges. (See *Carinated.*)

*Bicornute.* Like, or having two horns.

*Bifid.* Cleft in two.

*Boss.* The projecting point in each valve, near the hinge in Bivalves; the commencement of the shell.

*Byssus.* A bunch of silk-like fibres, by which many species of Bivalves are attached to other substances.

*Callosity.* A thick mass of shelly matter.

*Canal.* A groove or gutter observable in different parts of certain spiral shells belonging to the *Zoophaga*, or carnivorous tribe. In these the canal is either lengthened, as in *Murex*, short, as in *Harpa*, or truncate, as in *Buccinum:* in the two latter it thus gives place to a notch, but in all these instances, it is that part fitted for the protrusion of the long cylindrical siphon possessed by all these animals.

*Cancellated.* When the surface is marked by striæ or lines, which cross each other at right angles.

*Cardinal Teeth*, in Bivalves, are those placed immediately beneath the bosses, and between the lateral teeth, where such exist, as in the common Cockle.

*Carinated.* Ridged like the keel of a boat.

*Cartilaginous.* Gristly, like a tendon.

*Chambered.* Divided internally into compartments, as in the testaceous *Cephalopoda*, or *Nautilus.* (*Polythalamous.*)

*Columella* (or *Pillar*). The internal support of most

spiral shells, round which the whorls convolute ; it is not present in *Solarium*, *Delphinula*, &c.

*Concentric.* Arranged in parallel curves or bands, having one common centre.

*Convoluted.* The whorls rolled regularly one over the other.

*Cordate.* Heart-shaped.

*Corneous.* Resembling the colour or substance of horn ; the epidermis of some, and the operculum of other spiral shells often present this appearance.

*Coronated.* Crowned, towards the *apex*, by a row of spines.

*Crenated.* Notched.

*Cuneiform.* Wedge-shaped, as *Donax*.

*Dentated.* Toothed.

*Dextral.* Spiral shells are so called when the mouth faces the *right* hand of the observer, the shell being held with the *apex* upwards. The great majority of spiral shells are dextral, but frequently in the very same species (as in *Bulimus*) individuals occur whose aperture is reversed, or appears on the *left* side. (See *Sinistral.*)

*Digitated.* The expansion of any particular part, as in the outer lip of the *Pteroceras*, into finger-shaped processes.

*Discoid.* Disk-shaped, much flattened. The fresh-water genus *Planorbis*, and many of the *Helicidæ*, or land-shells, are of this form.

*Dorsal.* Belonging to the back.

*Effuse.* Having the lips separated by a gutter or channel.

*Entire.* Having the mouth undivided at the base by a channel.

*Epidermis.* The membranous covering of some shells.

*Epiphragma.* A covering to the aperture of some spiral shells, which (unlike the *operculum*) is not attached to the animal. (See *Operculum.*)

*Equilateral.* When the two sides of a Bivalve are equal, the bosses being nearly or quite in the middle; as in the *cockle.*

*Equivalve.* When the two valves of a Bivalve are equal in size; as in the *cockle.*

*Eroded.* Gnawed, or rubbed.

*Fibrous.* Resembling fibres: applied to the substance of a shell, it indicates those, like the *Pinna*, whose fracture presents perpendicular fibres.

*Fluviatile.* Living in fresh water.

*Foliated.* Composed of thin plates, lying on each other, as in the shell of the *oyster.*

*Fusiform.* Shaped like a spindle, swollen in the middle and tapering to each end.

*Gaping.* In Bivalves, when, the shell being closed, the valves do not touch each other in every part.

*Gelatinous.* Like jelly.

*Hinge.* The part where the valves of a Bivalve are united, consisting of ligament and teeth.

*Hyaline.* Of a glassy, thin, and semi-transparent substance.

*Inequilateral.* When the sides of a Bivalve are unequal in length. (See *Equilateral.*)

*Inequivalve.* When the valves of a Bivalve are unequal in size and shape, as the *oyster.* (See *Equivalve.*)

*Inferior Valve.* In adherent Bivalves, that by which the shell is attached to other substances.

*Iridescent.* Pearly, or having the appearance of pearl.

*Irregular.* In Bivalves, when the individuals of a species are not all of the same shape.

*Lanceolate.* Shaped like the head of a lance.

*Lateral.* Any thing on the sides of a shell. Thus the lateral teeth of Bivalves, where they exist, are on one or both sides of the cardinal teeth, which are always in the centre, under the bosses.

*Length of Shells.* Spiral shells are measured from the *apex*, or tip of the spire to the *base*, and therefore perpendicularly; but the length of Bivalves is taken horizontally, or from the anterior to the posterior margin.

*Ligament.* A cartilage connecting the two valves of a Bivalve.

*Lips.* The two sides of the aperture of spiral shells are termed the lips. That which joins, and generally folds over the lower part of the columella is called the *inner* lip, while that part of the circumference opposite is called the *outer* lip.

*Litoral.* Belonging to, or found on the shore.

*Lobed.* Having broad finger-like divisions.

*Longitudinal.* In Univalves, stripes or marks from the *apex* to the *base* are called *longitudinal*, in opposition to *transverse*, which is applied to such as cross the shell, or are parallel to the whorls: in Bivalves, stripes from the anterior to the posterior margin are *transverse;* from the bosses to the ventral margin *longitudinal*, or more properly *radiated.*

*Marine.* Belonging to, or found in the sea.

*Monothalamous.* Having only one chamber, in opposition to *Polythalamous:* the *Argonauta* is an instance.

*Muscular Impressions.* The indented marks in acephalous Bivalves, which indicate the insertion of the muscles, by which the animal is attached to its shell. Of these there are three principal sorts: lateral, central, and pallial. 1. The *lateral* impressions indicate the animal to have two adductor muscles, as in *Unio, Cardium.* 2. A *central* impression shows the presence of one adductor muscle, which is generally in the middle of the shell, as the *Oyster.* All these shells are, however, furnished with a third or *pallial* impression, which is indicated by a depressed line running parallel with the ventral margin. (See *Adductor Muscle.*)

*Obsolete.* This term implies a faint indication of particular characters. Thus, very slight or partially indistinct striæ upon a shell are called *obsolete* striæ, not because they are worn off by accident, but because they are only rudimentary, or very slightly developed.

*Operculum.* A hard shelly or horny lid, which covers the aperture of many spiral shells, and is attached to the foot of the animal. (See *Epiphragma.*)

*Orbicular.* Quite round.

*Ovate.* Egg-shaped.

*Papyraceous.* Excessively thin, like paper.

*Peduncle.* A stalk, or support.

*Pelagic.* Belonging to, or found in, deep seas.

*Perforated.* Having holes, as if bored by a sharp instrument, as the *Haliotis.*

*Phosphorescent.* Shining in the dark, like the glow-worm.

*Plaits.* Folds, or raised lines on the *Columella.*

*Polythalamous.* (See *Chambered* and *Monothalamous.*)

*Posterior.* The side of the shell, in Bivalves, opposite to

that on which the ligament is placed. (See *Anterior.*)

*Recurved.* Turned backwards. The canal of some of the genera *Strombus* and *Cerithium* is remarkably so.

*Reflected.* Turned or folded backwards, as in the thickened lip of the common *Helix.*

*Retractile.* Capable of being drawn backwards.

*Retuse.* When a spiral shell is retuse, the inner whorls appear to have been pressed into the body of the shell, and the *apex* is below the level of the last whorl.

*Reversed.* The same as *sinistral.* (See *Sinistral.*)

*Sessile.* Attached to any body, without a stalk or peduncle.

*Sinistral.* Having the aperture on the *left* side, as opposed to *dextral* (see *Dextral*), also called *reversed.*

*Sinuous.* Waved.

*Sinus.* A gutter, or curvature, in the lip of Univalves.

*Siphon.* A fleshy sucker.

*Spire.* Those volutions of a spiral shell which are above the lowest or body whorl collectively form the *spire* of the shell, whatever shape it may assume. The variations in the form of this part are numerous. In some it is excessively lengthened; in others it is not even raised above the body whorl. In *Planorbis* the spire is sunk, while in *Cypræa* it is so small as only to be seen when the shell is young, after which it is covered over by the enlargement of the body whorl or principal volution.

*Striated.* Marked with lines, either elevated or raised, at parallel and nearly equal distances.

*Sub.* Almost, or approaching to; as sub-fusiform (nearly fusiform), &c.

*Sutures.* The corkscrew line formed in the spire, by the whorls wrapping over each other.

*Tentacula.* Arms or feelers.

*Terebrating Testacea.* Such as take up their habitations in other substances, as *Pholas*, &c.

*Testaceous.* Composed of the materials which constitute shell.

*Transverse.* See *Longitudinal.*

*Truncated.* Cut short off, or ending abruptly.

*Tuberculated.* Covered with small protuberances.

*Turbinate.* Having the body of the shell large or swollen, and the spire comparatively short.

*Turreted.* Having the whorls gradually decreasing, so as to form a fine point at the *apex*.

*Umbilicus.* A small hollow, or sometimes a deep hole, on the side of the inner lip in spiral shells, formed by the inner edges of the whorls not touching each other: in some genera, as *Scalaria* and *Solarium*, it is so deep as to extend to the *apex* of the shell; in others, as *Trochus*, it is small; in *Bulimus* it becomes nearly obsolete; and in *Natica* it is often entirely concealed by the spreading of the inner lip.

*Varices.* Longitudinal raised bands or ridges, which occur at regular distances in some Univalves, as *Murex*, *Triton*, &c. They mark the progressive enlargement of the shell, being the remnants of former apertures, beyond which the animal, when grown, forms another aperture.

The greater part of these explanations are taken from Mr. Swainson's *Malacology*.

THE END.

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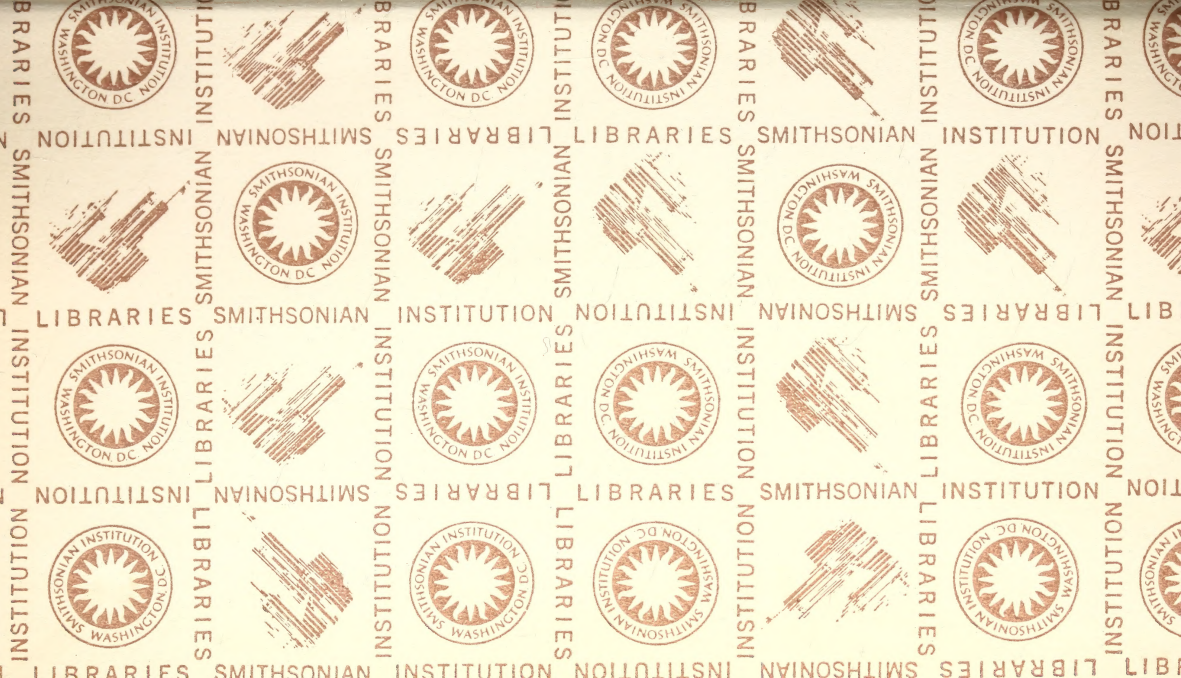
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